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MOUNTED MARKSMEN, AND THE DISMOUNTED SERVICE OF CAVALRY.

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MILITARY authorities of leading European nations agree that an army possessing a large number of mounted men capable of being used as infantry has an incalculable advantage over one that has them not.

Of late years, whenever we have gone to war a force of mounted marksmen has been in demand. This force has always been raised hastily by contribution from the different infantry regiments on the spot, and mounted on whatever animals were available. The Officers have been furnished in the same manner. Officers and men rejoin their respective regiments on the termination of the war; there is no time for any perfect system to be worked out, and they are too short a time together to admit of much organization. Being so hurriedly got together, men, Officers, horses, and equipment look, and are, a very scratch pack. A great deal of expense is entailed in equipping this force, and regiments that contribute the men are thereby unexpectedly weakened at the most inconvenient time. Still, imperfect as is the state to which they have hitherto attained, it is acknowledged that a body of mounted marksmen is invaluable to an army in the field. A force to meet this call should therefore be raised in time of peace, when it can be properly trained, its imperfections eradicated, and its organization perfected.

The manner in which mounted infantry, as at present organized, are or should be utilized, is by advancing them (under cover if possible) on a desirable position, and when dismounted opening fire. If threatened by cavalry or otherwise, they mount and retire; harassing the enemy by repeating the manœuvre in whatever direction it may be advisable to do so, as frequently as necessary. Their sole arm is their rifle and bayonet. They cannot be used as cavalry, because they have no swords or lances, and they are not sufficiently trained to

undertake outpost duty effectively. The horses become mere conveyances for advance and retreat, with the object of keeping the men fresh and unfatigued, and enabling them to move quickly from point to point. Generals on service, finding it necessary, besides cavalry and infantry, to have a cross between the two, have hitherto had to be content with mounted infantry, a body which is lacking in some of the most essential characteristics of both the older branches of the Service, without proportionate corresponding advantage.

This is wasted economy. By proper organization, a force fulfilling all the duties of mounted infantry, combined with the power to act as cavalry, can be constituted. To do so, the material used should be that branch of the Service which can furnish men who have already acquired the greatest amount of the necessary training, and are likely to be most intelligent. Consider which requires most training, a cavalry or infantry soldier? It takes double the time to complete the training of the cavalry soldier, and when he is trained double the amount of knowledge should have been acquired by him.

Again, for what branch of the Service is the difficulty of obtaining recruits least experienced, and which contains the most intelligent men? Cavalry. One reason is, when recruits with any self-respect, pride, or conceit (call it what you like) about them decide on enlisting, they choose regiments the representatives of which they have seen walking about in the neatest looking, most picturesque, or ornamental clothes. This is why cavalry, Guards, Highlanders, and other smart corps get, as a rule, a slightly better and more intelligent class of recruits.

Before going so far as to equip cavalry regiments as mounted marksmen, as objection to so doing would undoubtedly be raised, steps should be taken to settle the question, if it be a question, whether or not it is possible for cavalry to perform their own duties as they do now, and substitute for their present inefficient dismounted practice the duties of mounted marksmen.

This can be done with ease, and at but a trifling expense, by raising a corps, or still better two or three corps of moderate size, say 600 men each, composed of drafts from cavalry regiments. They should, of course, all be selected for general smartness and good shooting, though it would not be necessary to pick all the best men in each regiment. Obtain the horses from the same source.

The armament should be a rifle carried on the saddle, except in the vicinity of the enemy, when it should be carried on the soldier's back; a bayonet always carried by him strapped to his waist; and a sword strapped to the saddle close to the near shoe case—it would, if carried by him in the usual manner, only encumber him when dismounted; he only requires it when mounted, so why should it leave the horse?

Some Officers who have served with mounted infantry say the rifle should always be carried strapped on the soldier's back. I think this is a mistake. If they had ever tried it during a long ride at the beginning and end of a day's shooting abroad, they would have found it most fatiguing. Besides, it is useless. In any case the horse carries both, so why should it be borne by the man until likely to be wanted? The rifle should usually be carried attached to the saddle on the

off-side of the horse. In action, or even on approaching an enemy, it should invariably be slung on the man's back. The present sling used is unsuitable, being too loose, and one must be made on another principle. The sling submitted to the Horse Guards by Colonel Mackenzie, 3rd Bengal Cavalry, is one of the best in existence, it is better and more comfortable in every way than any other: it is only meant for the carbine, but I can suggest a slight improvement, which would render it suitable to a longer weapon.

It would be a question for consideration whether the trial force, once formed, should be kept up by drafts of horses and men from cavalry regiments, or whether it would be best to enlist recruits specially for it. There are reasons for and against both systems. Among those in favour of the former is that by this means you would always make sure of getting proved good shots, and having to devote no time to training recruits and young horses, more could be given to other duties. But I think it would be found, for other reasons, more satisfactory for each corps to have the training of their own men and horses.

The Officers should be appointed from cavalry regiments for the same reasons that apply to the men, namely, that they have acquired by their training a wider knowledge of many of the most important duties of mounted marksmen, and because the training of infantry Officers accustoms them to work mounted men in too contracted and slow a manner; because also, the latter would not so readily grasp the feasibility of extracting the greatest possible amount of information to be acquired with the help of mounted men as the eyes and ears of an army in outpost duty, &c.; neither are they thoroughly acquainted with that knowledge, without the pre-eminent possession of which the efficiency of a cavalry regiment is greatly lessened, *stable management*.

A fault in the generality of cavalry Officers is that they are inclined to confine their movements too much. Cavalry regiments are not worked on a sufficiently extended scale; they are constantly worked in a too limited space—a field, perhaps. You may see corresponding regiments in other countries—not only the so generally quoted Germany—taken out and efficiently worked over twenty miles of country. Certainly their horses do not look so sleek as ours, but we cherish our horses too much. Some Colonels almost have a fit if five fresh horses are reported unfit for duty after a field day. This does not clash with what I say about stable management. Let the horses be thoroughly cared for when in the stable, but when out much more work should be extracted from them, and they should be cast with greater freedom when unserviceable. Make the fit horses earn their food, and cast the cripples.

With few exceptions, whenever they have had command of a mounted force, the above-mentioned fault of too limited a scope of action applies to infantry Officers, except that instead of using a field they use half a field. I, of course, only wish to point out that the system of drill and tactics learnt by infantry Officers is not of the style to fit them generally for a command of this kind, though some few might be mentioned who are naturally cavalry leaders. One qualified infantry Officer should be appointed to each corps temporarily to

assist in the instruction of that part of the drill necessary to render the force effective when acting as infantry. The corps should acquire a sufficient knowledge of infantry drill to ensure their efficiency as infantry in the field, should they be called upon to act as such. But this instruction should be strictly confined to necessary practical movements. No time should be wasted on unnecessary parade movements, &c.

The force being constituted and armed as above, it only remains to show how they can be used, as cavalry, or when necessary, as infantry, according to circumstances.

Little need be said about their efficiency as cavalry. They are similar to any other cavalry regiment, Officers and men having acquired the same training.

They are fully qualified to act as infantry, should they be called upon to do so, at any moment, as by this time we will presume they have acquired the necessary amount of infantry drill. The Colonel, on receiving an order to the effect that his regiment is required in their capacity as infantry, dismounts the required number—half, two-thirds, or three-fourths of his force. In most cases it would be unnecessary to use more than two-thirds. One man in every three, in this case, would remain mounted, and lead the other two horses wherever directed. The number of men to be dismounted for infantry purposes would entirely depend on circumstances. One man can generally ride one horse and lead two; in some cases he could lead three, but three to lead are rather a handful if they are inclined to be troublesome. If the dismounted party should be required to act as infantry till their return to camp, the mounted party, if desirable, could return there immediately, and water, feed, and groom the horses. If their services were only temporarily wanted, the mounted portion should follow the regiment at whatever distance ordered until required.

Let us now have a look at the dismounted men. They are formed up as infantry; they have each a rifle and bayonet and sixty rounds of ammunition, and a pair of boots in which they can do as much walking as any other infantry soldier; they have breeches and gaiters and a loose service coat without any stock or padding; they are thoroughly drilled, and, having left their spurs in their wallets, forget what their horses look like, and feel as independent of them as any other foot soldier. In what manner, may I ask, has a similar number of any other infantry the advantage of them?

Little need be said to point out the facility with which they can act as mounted marksmen. They can perform all the duties mounted infantry have hitherto been required to perform with only one difference, viz., that being well organized, equipped, and mounted, and being accustomed to drill and work together under their own Officers, they will perform them with double the confidence, and consequently twice as well. Time will prove that there are other ways in which this force will be able to act as no other force can.

Suppose, for instance, there is a small position occupied by an enemy, say on a hill a couple of miles off, the approach to which is

bare of cover. Infantry attacking would be under fire a long time, and if they crossed the intervening space quickly, would be blown on arriving at the foot of the hill. In fact, it is a nasty place to approach.

Attack it with cavalry equipped so as to be serviceable as infantry. Divide them into three large squadrons. The attack is made simultaneously—front, right, and left; they advance in extended order, with scouts well in advance at a gallop. Increasing their pace till near the hill, they rally and dismount two-thirds or three-fourths, as the case may be, at places chosen by the squadron leaders, who, once started, should maintain sole command until the regiment is once more combined. They should time their advance so as to arrive simultaneously; the Officer commanding the squadron of direction should watch and be watched by the others so as to accomplish this. Having dismounted, they should carry the position with a rush. The advantage in this case is that, instead of infantry having to advance two miles at a slow pace, under fire and wasting time by firing themselves, and arriving blown and tired, their effort still to be made, they would arrive fresh and keen, and having suffered comparatively slightly from being under fire. It is astonishing how easy it is to miss an object approaching at a great pace, and, remember, they are in extended order during their advance.

Musketry.—At least one Officer per troop should have gone through the course of musketry at Hythe, and the remainder should do so as soon as possible. Ranges should be erected so that the whole regiment could practise at the same time, each troop on its own range, under the troop Officers. In this manner the amount of work that usually takes eight weeks can be done in one week; and instead of cramming all the rifle practice into a limited time, it would be far better if the whole regiment were taken for that purpose once a week, or at any rate once a fortnight.

The incessant practice at ranges where the distances are known should be considerably varied by practice at unknown distances; in action men have to form their own opinion as to the distance of their adversaries, the enemy are not in the habit of carrying about placards giving accurate imformation as to their distance, correcting the placards as their distance varies; so men taught only to shoot at ranges where they know the distance are much at fault when they are thrown on their own resources. A difference should be made in the amount of practice compulsory for a proficient marksman and for a bad shot. When men attain a high standard of proficiency, their attendance to a certain number of target practice parades should be voluntary. Men who shoot badly should be paraded oftener for target practice.

It may be said that it will not be easy to get these men to shoot as well as if they were infantry soldiers. I beg to differ. Rifle shooting is simply a matter of practice. If you take fifty men out of an infantry regiment, and the same number out of a cavalry regiment, and let them shoot against each other, the infantry will beat the cavalry for two reasons; first, because they have more practice, and secondly, because they have a better weapon. But let them be given similar weapons, and similar training for a few months, and the

shooting will be equal. As a matter of fact, I once saw a match between a team of cavalry and a team of infantry who rather fancied themselves, which turned out very unexpectedly. The match was seven shots at 200 yards, seven at 500, and seven at 600 yards, cavalry using carbines, infantry rifles. The result was in favour of the cavalry team. The teams then changed weapons, the result again being in favour of the cavalry. I need hardly add that that team was very well trained. Of course this is exceptional; but it proves what I say, that shooting entirely depends on the system of training. Most men, before joining any branch of the Service, have never fired a rifle. Those prove the best shots who practise most. For this reason only, and because they are armed with a better weapon, do infantry shoot better than cavalry. It may be said that mounted men cannot devote sufficient time to attain proficiency in shooting. I think they can. It entirely depends on the system employed.

With regard to the best rifle for cavalry, though I do not allow that they cannot carry the Martini-Henry rifle if it is impossible to provide them with an equally effective shorter weapon, if a rifle can be made something between the carbine and rifle in length with as good shooting power as the rifle, it would be a more perfect arm for cavalry. It might be made more on the Express principle, a large charge of powder and perhaps a slightly smaller bore, say ·400 instead of ·450. This ought to give a much flatter trajectory up to 500 or 600 yards, and be equal to if not better than the rifle at greater distances. Perhaps if the bullet were too small or light, the wind would affect it after 600 yards; this should be guarded against.

Were it decided to-morrow to equip cavalry with a new rifle, a little shorter and consequently more portable than the Martini-Henry, in all probability, owing to the usual delay, two or three years at least might elapse before it was served out: it would therefore be advisable to arm the trial corps with the present rifle until one more suitable can be issued. It would be a great point gained if cavalry and infantry possessed the same rifle and ammunition, as by this means all complications with reserves could be avoided.

Though late wars have shown that but little execution is done at much over 500 yards, we must have 300 or 400 yards in hand in whatever rifle we use. Suppose, for instance, that because the present cavalry carbine shoots very well up to 500 yards, we arm our cavalry to act as mounted marksmen with it, how should we feel if we found ourselves opposed, say to an Austrian Army, whose cavalry were armed with a rifle as good at 900 yards as ours at 500 yards?

No! our cavalry should have a better weapon; one with which they can hold their own.

A magazine rifle with equal shooting power to the rifle I have suggested would be a good weapon. It is stated that men so armed are apt to fire too quickly, but that is a mere matter of discipline. When the Snider rifle first came out, a certain General, I forget who, used to make his men take off the nipple guard and put it on again several times between each round, to accustom them not to fire too hurriedly.

A question I leave for others to decide is whether if armed with a

magazine rifle a bayonet would still be necessary. In deciding this point all possible positions in which mounted marksmen might be placed should be considered.

Mounted marksmen might under certain circumstances be separated from their horses, and their ammunition being expended they might be attacked by cavalry or infantry; and there are other positions in which they might find themselves when a bayonet would be necessary.

To show that I am not a mere theorist in the matter of shooting, in stating that carbines are perfectly effective up to 500 or even 600 yards though they are insufficiently accurate at greater distances, I may mention that a squadron team of four of the 14th Hussars, when competing for the Loyd-Lindsay Prize in India, a few years ago, made a score of 129 out of 160 points, which is, I believe, the highest score ever made in that competition. Every shot was on the targets, no miss having been made at either distance.

Three-quarters of a mile was galloped over, two flights of hurdles were jumped, and forty shots fired, each man having fired five at 300 yards and five at 400 yards; and the team was drawn up at the starting post, having completed everything in nine minutes.

On the last target, that at 400 yards, ten out of the twenty shots on it were bulls-eyes.

The state of perfection the team attained was due to the fact that the Officer commanding the regiment encouraged shooting and facilitated the necessary amount of practice.

I can vouch for this account being correct in every detail, as I was one of the four myself, and coached the team.

Carbines are very good at 500 yards and fall off very slightly at 600 yards; I have seen a very good shot (Corporal Robinson, 14th Hussars) make 92, and another man make 91 of a possible 105, in 7 shots at 200, 500, and 600 yards each, 21 shots in all.

Ninety-two was the score made with the Martini rifle that won the Queen's Prize at Wimbledon, under similar conditions a few years ago.

The carbine is not nearly so reliable at greater distances.

Some may think I have proved too much, and rather demonstrated the sufficiency of existing carbines. But we must remember the above are exceptional performances for a carbine. We must strike an average and find a weapon suitable to the generality, and one that shoots better at long distances than a carbine.

Weight affecting Efficiency.—There could be no greater mistake than to arm this force with a carbine instead of a rifle or, in my opinion, to dispense with the bayonet. Someone is sure to suggest something of this kind:—they will perhaps say the rifle is awkward to carry, or too heavy; perhaps it may be even said it looks ugly. The suggestion reminds me of the answer we all remember given by the sportsman to the novice, who remarked that his horse, which happened to be an undeniable hunter, had a very ugly head, "True, sir, but I don't happen to ride on his head."

Lancers carry a lance, sword, and carbine: the total weight of these three far exceeds the weight of a sword, rifle, and bayonet. A rifle and bayonet exceeds a carbine by very few pounds. If it is necessary

to diminish the weight of mounted men, there are more practical ways of doing so than by tampering with their weapons or insisting on the men being very small.

When no other objection can be found, people often fall back on the statement that a proposed article, whatever it may be, "is too heavy," and considering the statement unanswerable, expect their opponent to immediately collapse.

In furnishing a soldier, the first thing to be considered ought to be what weapons are necessary; those weapons being decided on, heavy or light, they should be sacrificed to nothing. The second thing to consider is the required stamp of men, and in case of cavalry the necessary stamp of horse.

Wherever weight is to be saved it is certainly not in the weapon, which is, indeed, the *raison d'être* of the soldier. Better take a man's coat off his back than deprive him of a particular weapon because it is a few ounces heavier than a less valuable substitute.

In a flat race every pound tells, because the horses, who are trained to run for their lives, have to get over a limited distance at the greatest possible speed; but there is none of this kind of thing in cavalry work; and though every unnecessary pound should be dispensed with, the importance of using a good stamp of soldier and perfect weapons should not be sacrificed for the comparatively small matter of lessening the total weight the horse has to carry, and that so slightly as not to benefit the horse materially. Very small men have not sufficient endurance and stamina.

What stamp of men do you generally see in at the death after a hard run? Who are the best polo players? Who are the most successful pig-stickers in India? Four-fifths of them are men from 11 st. to 13 st. 7 lb., or heavier. In theory they ought to be men from 8 st. to 10 st. 7lb., but such is not the case.

This, perhaps, may be partially misleading, should it not be remembered that many very heavy weights chiefly maintain their position in the field by buying more expensive animals than their lighter brethren; but this does not completely nullify the argument. However, certain articles carried by our cavalry might, I think, be carried otherwise than by the horse, or dispensed with, if necessary to make way for an increase of a few pounds of weight in an improved weapon.

A cavalry soldier parades in marching order with a valise on his saddle containing a complete change of underclothing, gloves, hair brush, comb, &c. I do not remember ever seeing a man use any of these things until the tents were pitched. If it is dry he does not want them, and if it is raining and he is wet through he has work to do in the first place which generally occupies him until the baggage arrives; and secondly, if he has done his work he has no cover under which to undo his valise and change until the tents are pitched. He may go inside and change then if he likes; but if it has been raining heavily he will very likely find the kit in his valise as wet as that on his back. However, dry or wet, why should it not be carried in the same conveyance that brings his tent, &c.? In cases where the

transport runs short he can carry it and other things if necessary, but all this useless dead weight should be avoided whenever possible. Again, what is the use of a man, when on active service, carrying about a brush and comb? Is it not far simpler to remove his hair by running a clipping machine or a pair of scissors over his head, as I have often seen done. It is most comfortable and healthy. An Adonis chary of parting with his love-locks might console himself by the reflection that his hair would only grow the thicker after trying the treatment I recommend during a campaign. He will find it a most successful hair restorer. A cloak, instead of being so generally carried on the saddle, should only be carried in case of wet weather, or the probability of having to bivouac for the night. All the kit it is necessary for a soldier to carry is, a set of shoes for his horse, his horse's food, picketing kit, a dander brush, a horse rubber, his own rations, and an oil rag; everything else should accompany his tent.

Clothing.—I would suggest it might be well to try what I think will be found an improvement in the system of clothing the British soldier. The efficiency of an army depends a great deal more on perfection of dress and accoutrement than can be imagined by superficial observers. It has been gradually dawning on us during the last few years that the uniform of our Army is not sufficiently comfortable; the consequence is that efforts have been made to make it more so, without detracting from its smartness. The results have proved more or less failures. Uniforms are certainly becoming more comfortable, but the smart dress of the British soldier is gradually disappearing; and if we go on much longer at this rate it will be difficult to distinguish a soldier from a policeman. Now this won't do at all. There never was a truer saying than "Fine feathers make fine birds." Do away with gaudy dresses in time of peace, and feats like the charge of Balaclava and other corresponding gallant deeds will only be read and sung of, if not forgotten.

It is hardly necessary to prove the advantage of attractive uniforms. Anyone who has tried to follow up the question must see it. Give a man a uniform he is proud of, and it makes him twice as good a man as he would be without it. Proud of his uniform he becomes proud of himself. He goes on to question himself as to whether he deserves that pride; he then determines to deserve it; his character and sentiment improve; he emerges like a butterfly from a chrysalis; from a heavy-brained, sottish lout, to become a smart, intelligent, dashing soldier, a something nearer deserving the term—a gentleman; a summit of perfection we all endeavour to attain. Now it is almost an impossibility to combine fully a smart soldierly appearance with comfort and utility in any garment. Appearance must be kept up for the sake of the Service, and comfort and utility must be remembered when we are on a campaign.

In most regiments the men are in possession of two tunics. Instead of this I think it would be found better if they were provided with one tunic made very ornamental, to be worn at reviews, on Sundays, and on all occasions when a very smart turn-out is neces-

sary, and one marching-order coat, something loose and comfortable and devoid of ornament, to be worn on marching-order parades, night guards, &c., and whenever appearance need not be considered.

Cavalry should have two distinct dresses. One should be as ornamental and attractive as possible, and fit like a glove, tunic, breeches, and boots, to be worn on all show occasions. The other dress, a loose Norfolk jacket, breeches, gaiters, and ankle boots, should be devoid of ornament; comfort in it should be considered as much as ornament in the other. When going on service the ornamental dress should be put into store, the marching-order dress only being taken. The men should, of course, retain the smart cap and jacket now in use in undress in all cases except when on service.

I will now venture to digress for a few moments, and say something on a matter allied to, but not identical with, the subject of this paper:—I refer to mounted infantry.

When the system of training cavalry as mounted marksmen has been thoroughly worked out, but not till then, I would make a desirable and important improvement in infantry regiments.

It would prove in many ways most advantageous to infantry to have at the disposal of each battalion a small proportion, say one company per regiment, taught to ride; these I would arm with a rifle and a bayonet only.

This training should be carried out in the following manner. There are those who hold that infantry do not require much care in teaching them to ride sufficiently to perform their duties as mounted infantry, and that small and indifferent horses will serve their turn well enough: but this appears to me a half-hearted principle. If men have to be taught to ride it is almost as easy to do it well as ill, and will prove much more satisfactory in the long run. A cavalry depôt should be formed at Aldershot or some equally central place, the instructors of which should be well versed in the training of mounted marksmen, and thither regiments should send companies to go through a course of instruction. Horses supplied from cavalry regiments should be kept there for their special use. The course should last about six months. During the course the men should ride at least about one hour or one hour and a-half in the morning and one hour in the afternoon. They should not only learn how to ride a horse, but also how to groom and otherwise look after him, how a saddle and bridle should fit, and all similar necessary details. A few should be taught as much farriery as possible in the time, and some should learn how to stuff a saddle, &c.

Too much time should not be wasted in letting them jog round a riding-school, but as soon as they begin to feel at home they should be taken out and bustled over a few fences. Meanwhile they should be thoroughly instructed in the duties of mounted riflemen and outpost duty; as soon as they are sufficiently advanced they should be practised in the following manner, under experienced Officers the first time or so, and afterwards under their own.

I. Information having been received that a small force had encamped the previous night, 10 miles off at an indicated place, the

mounted riflemen are sent out to find them, and if suitable engage them.

II. On another day, a position, say 6 miles off, is mentioned, and the mounted riflemen are sent to attack it. Thence acting as a rear guard they should fight their way back to barracks.

They should on these occasions be taught the principles of advance and rear guard, flankers, &c., so as not to be caught napping.

On other days they should be sent on outpost duty.

On these duties they should be taken across country to a certain extent.

They need not practise ball firing during the course: presumably they are all good shots.

At the completion of the course, the Officers and non-commissioned officers should be required to pass a limited examination. They then should return to their regiments, dismounted as they came. Having returned to their regiments, to enable them to keep up their training they should occasionally be mounted on the necessary number of horses provided for them by a cavalry regiment, should there be one at the same station. Here you see the advantage of the men having been trained properly to ride cavalry horses.

For instance, suppose the 3rd Hussars, 4th and 5th Regiments, are stationed together at Colchester. At 6 A.M., 1st January, the trained companies of the 4th and 5th Regiments will march to the stables of the 3rd Hussars, saddle, bridle, and turn out the horses told off for them; then form up and march off. On the completion of their manœuvres, they return, water, feed, and groom the horses. They then march back to their own barracks. This may be done once a fortnight, if possible, but even an occasional day would prove sufficient to prevent them getting too rusty.

Should a regiment with a trained company of mounted riflemen be where no cavalry are stationed, they must wait for an opportunity. I can almost fancy I can hear one theoretical objection to this system: "The horses are too large for infantry generally, not sufficiently quiet, and the men would take too long to mount."

This is nonsense! If a man is taught, he can ride a big horse, and if he can ride a big horse, he can ride a little one; the men having been trained on cavalry horses can ride them, or cobs, or ponies, or whatever they may come across in a foreign country.

As for such an objection, if we have to wait for every tinker who may choose to play "bob-cherry" with his stirrup when ordered to mount, we shall never get on; he would get his foot in and be off fast enough if a few bullets were whizzing about him.

We must have smart men for this kind of work, not dawdlers. Besides, infantry and cavalry men are much the same size, and can ride the same sized horses, and if they were not, after all it matters little. One way often unnoticed by superficial observers by which the British soldier shows his pluck is, that he will somehow or other generally manage to do whatever is expected of him. If men are told they can do a thing, *they will*. But if they are told they can't, *they won't*.

On service these mounted companies, having been fairly well trained in England, will take a very short time to adapt themselves to whatever animals may be provided for them. They will be found most useful as marksmen in action, as scouts, as mounted orderlies, for outpost duty if necessary, for reconnaissances, and for other purposes. I should say at least three or four companies could be trained in a year at Aldershot in a moderately large establishment, by two companies at a time, six months each two companies. If a greater number are required to be trained, increase the establishment; if more companies still are required, then organize a similar establishment elsewhere.

These men should have slightly better pay, as they will have more work, and be a little more scientific. A good class of men being required, their position should be made attractive and popular, both by dress and pay.

An increase of pay might, perhaps, prove more beneficial to the men if, after being put into one pocket, it were not taken out of the other.

> "Ha! what familiar memory in mine brain dost stir,
> Rich gifts wax poor when givers prove unkind."

There will be no difficulty in selecting the necessary number of smart Officers and men for this work, there is abundance of material of this sort in most regiments; of course they must be all skilful shots and intelligent. The Officers should be selected for their knowledge of musketry, horsemanship, and above all keenness. There are many infantry Officers with a very good knowledge of horses and horsemanship, learnt before their entrance into the Army and after. The companies should never be allowed to forget that they are mounted marksmen, pure and simple; they should not be armed with a sword, or taught to fight mounted. It will take them all their time to learn their work as mounted riflemen, and if they do that well they will prove most useful.

This scheme, I believe, is what is required: it is a plain, uncomplicated, simple, inexpensive method of training any required number of mounted infantry, without necessitating their permanent maintenance.

I now return to my original subject.

If one corps of cavalry prove capable of efficiently performing their duties as cavalry without deterioration, and also those of mounted marksmen equally well, what is proved?

Does it not stand to reason that all our cavalry regiments can do the same if equally well instructed? Of course Household Cavalry and regiments armed with a lance must be excepted, but with those exceptions every cavalry regiment in our Service should substitute for their present dismounted service the duties of mounted marksmen.

After all, I propose no such very great change, but simply a reorganization of our dismounted service.

If any falling off in the efficiency of their mounted work is detected under this change, we may be sure there is a screw loose

somewhere in the system employed. The weak point should be immediately sought for and strengthened.

It is acknowledged that cavalry should be trained to fight on foot. I do not propose any great addition to their work, but simply that instead of being trained to fight well when mounted and badly on foot, they should be so trained as to be able to perform both duties well. Why ignore such a valuable part of their duty?

It is because of their inefficiency in this respect that the demand for mounted infantry has arisen.

Captain Lumley, of the 13th Prussian Uhlans, a distinguished Officer of experience, in a very interesting paper on Mounted Infantry, from which I mean presently to quote certain paragraphs, states that mounted infantry should on no account be used as cavalry. I entirely agree with him. But it does not at all follow that cavalry should not on occasion be used as infantry.

What, may I ask, is the meaning of the present dismounted service of cavalry, and why have they carbines?

To enable them to fight on foot.

What are mounted infantry?

Mounted men who can fight on foot.

Why are mounted infantry more efficient for fighting in this manner than our cavalry, who also are trained to fight on foot?

Because they shoot better, because they have a better shooting-iron, because they are more suitably dressed, and because they are more suitably trained.

Is it not evident that if our cavalry are armed, trained, and dressed properly, they can do this work instead of their present dismounted practice?

Captain Lumley, in his paper, recommends that England should raise a large force of mounted infantry. It may be advisable for nations like Russia, with her hordes of Cossacks, to organize large forces of mounted infantry, but the system would never prove satisfactory for England; and I doubt whether it has proved so successful as expected even in Russia.

For England, with her compact but expensive Army, to organize mounted infantry on a large scale, or to carry out more than the limited company training, would not be judicious even were it possible.

But, by simply making a very slight alteration in her cavalry, England can in that branch of her service practically possess 15,000 riflemen.

How it is I know not, but British cavalry seems the last thing people care to meddle with. If they are closely criticized, the cry of *Noli me tangere* is so loudly raised that the critic has to beat a speedy retreat.

The present dismounted service of our cavalry is like a bad tooth that must come out. Pull it out then and have done with it, and no, we will not put in *a false one*, but let a second fill up its place.

This second good sound tooth is the service of mounted marksmen, and a very sharp tooth all those who try it will find it to be.

As an example of the extent to which the feeling that our cavalry

are not to be touched, for good or bad, sometimes goes, I may mention that whatever may be done in practice, though the cavalry carbine exercises have been assimilated for uniformity of drill to the infantry rifle exercises, neither the kneeling nor lying position in firing is recognized in that manual for cavalry.[1]

It is even within the memory of man, that it was held as an article of faith that the only legitimate use of the carbine was to be employed *as a pop-gun* when a vedette had to give an alarm. Well, we have improved since those days; but we must not shut our eyes to the fact, that though our present state may be considered good in comparison to the past, there is yet room for great improvement.

Many authorities say that mounted infantry should, on no account, be armed with a sword or taught to consider themselves cavalry; at the same time it is stated that cavalry should always attend them.

During the Crimean War, Europe watched with interest the performance of the Russian Dragoon Corps, numbering 16,000, half of which were cavalry and half mounted infantry; they were trained to act in concert.

This corps had no good opportunity of acting in combination and was not considered a success.

At the termination of the war the mounted infantry were converted to cavalry.

Now, again, the whole of the Dragoon Corps of Russia are armed with the long rifle and drilled as infantry when on foot; but I do not, by any means, quote them as an example, as they are but poor troops, their system and training being imperfect.

Mounted infantry in large numbers attended by cavalry in proportion are too unwieldy a force and will never satisfy expectations.

On the other hand, cavalry trained as mounted marksmen can watch their opportunity and act according to circumstances.

Napoleon, in speaking of mounted riflemen, simply expressed the opinion that "an army of 10,000 men, which could cover on an average 20 miles a day, would conduce as much towards the success of a campaign as one of 20,000 moving only 10 miles a day."

In reconciling this opinion with the fact that he did not use mounted infantry, it may be presumed that he did not consider a corps trained only as mounted infantry sufficiently remunerative to employ it, and that he did not organize his cavalry to absorb these duties, as he was otherwise too much occupied to devote sufficient attention to a subject requiring such great care in detail, perpetual supervision, and one that can only be undertaken in time of peace, starting with the material of first class cavalry.

It may be said, cavalry are so much required for mounted work that they cannot be spared for the work of mounted marksmen. Cavalry are never required to act in more than one way at once: they should be capable of acting either to attack as cavalry, for outpost

[1] See footnote, page 43, "Manual and Firing Exercises for the Martini-Henry Rifle and Carbine," para. VII, Firing Exercise, 1881. (The preceding edition contained instructions for firing kneeling, the direction to "bring the weight of the body on the right heel" being of course omitted.)

duty, or as mounted marksmen, with equal efficiency: and a good cavalry leader will always see at a glance in what manner to use his men with the greatest effect.

Cavalry Officers, as a rule, dislike the idea of using their men as infantry. Men who only understand thoroughly the use of their own branch of the Service are inclined to be bigoted and think it is the best, forgetting that each branch of the Service, as at present constituted, is only capable of utility in its own way. Besides, cavalry Officers have no opportunity of using their men effectively as dismounted men, as their arms, equipment, and training are at present very imperfect for that purpose; and yet no men are more capable, if properly trained, of performing the duties of infantry. The training of cavalry soldiers improves the nerve and brightens up the intelligence in a wonderful degree.

Many cavalry Officers think the present dismounted service of their regiments superfluous, unnecessary, and valueless; and little wonder, for they feel they cannot, with confidence, hold their own against any decent force. But let them find themselves thoroughly efficient as infantry when they are required to act as such, and birth will be given to a very different feeling.

There existed until recently an opinion, stated with confidence and supported by many adherents, that cavalry should be taught to despise the rifle, and that an intimate acquaintance with it would be calculated to make them lose confidence in their own powers; in short, it was thought that to ensure reliance in the sword it was necessary to encourage contempt for the rifle. "Where ignorance is bliss," &c., has occasionally perhaps proved true, but more often it is likely to prove a snare and delusion. If there ever was any merit in this opinion is a question, but whether so or not it is too late to use it now. Since the Franco-Prussian War, when France employed 40,000 cavalry and Prussia 54,000, all European nations, England included, have been making decided strides towards the end that will ere long be attained of combining the duties of mounted marksmen and cavalry. In all armies cavalry are considered imperfect unless they are trained to fight on foot. English cavalry go through an annual course of musketry with a Martini-Henry carbine sighted up to 1,000 yards, and are taught to fight on foot as skirmishers, &c. Their musketry training is continually being increased. Quite recently an order has been issued from the Horse Guards that cavalry Officers are to go through a course of musketry at Hythe; all this tends in one direction.

Taking into consideration the knowledge of musketry that cavalry already possess, it is evident that it will not prove in any way to their disadvantage to substitute for their present training as skirmishers the duties of mounted marksmen.

Mark how little is the alteration required to enable cavalry to perform the duties of mounted marksmen. Strap the sword to the saddle, as has already been advocated so often, supply a rifle instead of a carbine, and with a few slight alterations regarding boots, &c., the only addition necessary is more musketry instruction and a bayonet.

I wish particularly to draw attention to the fact that in consequence of the advance of the breech-loader the value of the cavalry has been generally acknowledged to have deteriorated; this decrease in value can only be counterbalanced by making them absorb the duties of mounted marksmen, instead of perpetuating their present dismounted practice.

In again referring to the erroneous popular idea that a knowledge of musketry deteriorates cavalry, how is it that though cavalry of the present day have a much deeper knowledge of musketry than either cavalry or infantry had thirty years ago, they ride as straight when required as ever they did?

Those cavalry of old who were unarmed with any sort of carbine or rifle did not ride with greater gallantry; and I am sure they did not know their duties so well as our cavalry do now.

I have in this paper tried to show the most effective and most economical manner in which to create mounted marksmen; and I may here assert that when this branch of the Service is used on the Continent, small numbers will be found insufficient; and it is only by the method I propose that England can ever have large numbers. It entails hardly any expense, and practically does away with the objection of recognizing a third branch of the Service, an objection so strong that no European nation will approve of it, though Russia is now making some attempt that way, and England is talking of it. They all are rapidly approaching the end I point out, by teaching their cavalry to perform a great part of these duties.

Some day we shall see no cavalry considered sufficiently valuable who do not fulfil the duties of mounted marksmen. It cannot be a matter of indifference whether England sets the example or not: those who have practised longest will perform best.

To ensure a fair trial it will be necessary to appoint to the trial corps carefully selected Officers.

It may at first be offensive to cavalry to use a rifle and bayonet instead of a carbine, but such feelings as they possess on this subject have already been trampled on by the great increase of musketry practice that has necessarily been of late years required of them, and we must risk raising a little more indignation; this will subside when in future warfare it is found that this branch of the Service is of greater utility than they have ever been.

As we are racing with other nations we should not be satisfied to merely march with the times, but whenever we can, get a step in front of them.

The term "Mounted Infantry" will be soon considered as much a misnomer as that of "Horse Marines" is now.

Our cavalry are good men well mounted. In teaching them to absorb the duties of mounted marksmen, if good results are not obtained with such good tools, *the carpenters will be to blame*. Once the system is thoroughly inculcated, good results should not be merely expected of Commanding Officers, but should be insisted on.

The fact is, the thing has never been tried in a manner to ensure success, and until it is so tried it will never be believed in.

Many systems have been tried: the reason they have all partially failed is that this sound principle has been lost sight of,—that the men employed should be *equally* efficient as cavalry and marksmen, and equipped so as to perform those duties equally well. Neither has use been made of the only material that can be depended on to accomplish the requirement thoroughly, viz., very efficient cavalry.

If bad cavalry are used they will not answer; if they cannot do one kind of work well they certainly cannot increase their work without deteriorating.

I refer to the systems tried by Russia, Germany, and America at different times, to which I have no space to allude fully.

In Russia and Germany the equipment generally used was a rifle, sword-bayonet, and pistol. The men were taught to consider their work on foot of greater importance than their cavalry work.

In America, though they were armed with a rifle, sword, and revolver, the men started without any knowledge of cavalry training, never were good cavalry, and never had good cavalry opposed to them. At the beginning of the war there was not a brigade of cavalry between the two armies, North and South: before the end of it 150,000 were employed. They were the most useful soldiers employed in the war, their performances are well known; but it must be remembered they never had to oppose good cavalry.

There has always been a bias on one side or the other; a perfectly sound system has never been worked out.

In spite of the faults in their previous organization, it is well known how mounted riflemen have turned the scale in many battles. For instance, Peter the Great's brilliant victory at Pultova, and its subsequent results, were owing to the masterly way he made use of this arm. I quote Captain Lumley:—

"The Czar covered his advance with 1,000 dragoons, who, coming upon the enemy, dismounted and opened the engagement, but on the infantry coming up they were ordered to form up in *ordre de bataille* alongside of them, on the flanks. A severe struggle took place, resulting in the defeat of the Swedes, who were closely followed up by Prince Menzchikoff with a large body of dragoons and cavalry, with infantry mounted *en croupe*. Coming up with them on the banks of the Dnieper, which they were unable to cross, he compelled General Lovenhaupt to surrender with 14,000 men."

Such a result could never have been obtained with infantry unaided, no matter how fast they marched.

Another example of what can be done by a combination of the horse and rifle mutually assisting each other, are the operations of General Sheridan, which "materially contributed to the surrender of General Lee's army at Richmond, and to the termination of the American War." Referring to this Captain Lumley quotes:—

"On the 29th of March, 1865, General Sheridan set out with 10,000 mounted men to carry out his great turning movement of the right flank of the Confederate Army. A severely contested fight occurred on the 31st, when he successfully resisted a combined attack of all three arms with his dismounted horsemen, at Five Forks, while,

on the 1st of April, he stormed and carried the enemy's position with three of his brigades. General Meritt, with the reserve brigades, taking up the pursuit, captured 6,000 prisoners, and caused a total loss of 13,000 men to General Lee's army. This battle of Five Forks virtually decided the fate of the war; for General Lee evacuated Richmond, and retreated in the direction of Danville, vigorously pursued by Sheridan's cavalry, who, seeing that the Confederates' force was too great for him to defeat by a direct attack, swept round its flank, crossing Sailor's Creek before it, took up a position across the road on the far side of the stream, and dismounting, disputed General Lee's passage of the stream. Operating in like manner at Lynchburgh, he got the Confederate Army between his and General Grant's forces, and thus brought about the surrender of the whole Confederate Army at Oppomattox Court House on the 9th of April."

Here 10,000 mounted men, armed with a sword, rifle, and revolver, were enabled to perform, by their adaptability to circumstance and mobility, what 40,000 otherwise organized could not have achieved.

Again, in speaking on this subject, Captain Lumley says:—

"In my opinion, the Battle of Mars-la-Tour, if compared with Sheridan's movements after the engagement at Five Forks, speaks greatly in favour of the employment of mounted infantry. Although the object in view was obtained in the former battle, by the noble sacrifice made by the Prussian cavalry, still, although a cavalry Officer, I cannot help admitting that the same result would have been obtained at a very much less expenditure of life and money had mounted infantry been employed."

It is evident in this case that if those cavalry had possessed rifles and had been trained to perform the duties of marksmen, they would have been much more valuable than either cavalry or mounted infantry by themselves, or the latter attended by cavalry. How often on service, when nothing but cavalry are available, is it said, "Oh! if we only had some infantry handy." And how often when infantry only are present is it said, "Oh! if we only had a few cavalry." But it is not only in pitched battles that cavalry would find the enormous advantage of being armed so as to act efficiently on foot. I take for instance one of the many brilliant performances of General Morgan in the American War:—

"Starting from Knoxville on the 4th July, 1864, he reached Medway on the 12th, having marched 300 miles in eight days; such was the extreme mobility of his flying column that the enemy were unable to obtain any correct information of his intentions or whereabouts. The result of this raid I had better describe in his own words: 'I left Knoxville on the 4th July, with about 900 men, and returned to Livingston on the 28th with nearly 1,200, having been absent just twenty-four days, during which time I had travelled over 1,000 miles, captured seventeen towns, destroyed all the Government supplies and arms in them, dispersed 1,500 home guards, and paroled nearly 1,200 regular troops. I lost in killed and wounded about 90 men.'"

Here we see an example of what splendid execution a smart cavalry

brigadier should be able to do with cavalry able to act efficiently on foot when necessary. Nothing but first class cavalry would answer for this work in Continental warfare, as they would always have to be on their guard against good cavalry. They should usually be used solely as cavalry, and only when absolutely necessary, and when good opportunity occurs, should they be called upon to act on foot. When so employed they should be able to act with equal confidence and efficiency, if they are not, better never use them at all than put them in a false position.

It seems that though the solution to this difficulty has been always staring us in the face no nation has the energy to grasp it.

This is not a matter to be shirked by theoretical assertions: there is only one way to test it, and that is by trial. And no superficial trial will do.

Three corps should be organized, great care being taken that the Officers are carefully selected. These corps should be stationed in different parts of the country and constantly inspected.

It will be found that this will produce emulation, and the greatest possible results might be expected. After a long fair trial, it will be within the power of the Officers commanding those corps to answer the all-important question satisfactorily. Can cavalry be so trained as to perform with equal efficiency the duties of cavalry and marksmen?

I trust that I may not be regarded as a bull in a china shop in handling this matter, and that it may not be thought that I thoughtlessly "rush in where angels fear to tread." Some may consider that, with insufficient experience, I suggest too great an increase in work for cavalry; but this is not so.

I am enabled to venture an opinion as to the amount of work men can do, and the most judicious manner to work them, as I have had the advantage of serving five years in the ranks of a regiment, the discipline of which I have not only never seen surpassed, but never seen equalled, the 2nd Life Guards, in which regiment I enlisted at seventeen and a-half, and from which I was promoted to a Sub-Lieutenancy in my present regiment seven and a-half years ago. I have no hesitation in representing that it would prove of the greatest advantage to all Officers if on joining their regiments they were obliged for the first six months, or year, to do a private's work, to groom their horses and clean their arms and accoutrements, in fact almost everything short of associating with the men in their barrack-room.

This might be limited to the time they are learning their drill, &c., with the recruits of their regiments, at which they should be kept at least eight months. It would prove of lasting benefit to them to be subjected to this training. They would thus possess knowledge of the details of a soldier's life that cannot be gained in any other way, and which go far to constitute the difference between an amateur and a professional. Officers passed by the medical board as physically fit for Her Majesty's Service should not find the work injurious in any degree, but entirely the reverse.

Though to me a novelty the only conspicuous alteration that I observed in myself when going through my training as a cavalry

recruit was that my muscle and appetite alike increased perceptibly, the latter sometimes to an inconvenient extent. In a certain cavalry regiment young Officers are made to go to their regimental farrier's shop and carefully learn the rudiments of a farrier's work. Practical knowledge of this kind is never thrown away. It cannot be stated that this is no work for gentlemen; they must be poor gentlemen, and would prove poor Officers, who thought such work beneath them when told it is for the benefit of the Service.

The author of "German Home Life" quotes the speech of a German General which contains a sentence that clearly points out the secret that ensures success in all undertakings of the description I propose in this paper. The sentence to which I refer runs as follows:—"Great results can only be expected when every demand of duty and honour shall first have been complied with, when, under all circumstances, the strictest discipline, and the most untiring industry, an industry which undervalues nothing, and thinks nothing trifling or insignificant, shall form the firm foundation without which the superstructure can avail us nothing."

Nothing is good unless it is perfect. Half measures never answer. Mounted infantry may be thought sufficiently effective when we have to contend with unscientific masses of Afghans, Zulus, Boers, and Egyptians, such as have been our opponents of late years; but when we are let in for the European war that will probably come sooner or later, cavalry equipped as I have tried to describe will, I think, be found more practical, and must be, I believe, *the force of the future*. The sooner we make them *the force of the present* the better.

I think this is the answer to the mounted infantry riddle which has been found difficult to solve.

In concluding these few suggestions, I would venture to express the hope that England, having seen in her last few little wars the use of mounted infantry, will not wait until other European nations have perfected the mounted branches of their service, and then by her own loss perhaps learn to appreciate their real value. No nation produces finer riders or better shots; combine these two in our cavalry, and you will shortly have a *corps d'élite*, unrivalled in smartness and efficiency, of which any country might well be proud, and of which all countries will surely be envious.

I thank you, ladies and gentlemen, for the kind attention with which you have listened to me.

The CHAIRMAN: Lieutenant Hamilton has given us, I think you will acknowledge, a most interesting lecture, though probably the views that he has expressed are different from those which would have been brought forward by Lieutenant Piggott. It is very advantageous that both sides of this question should be heard. I am sure many Officers present will not quite agree with Lieutenant Hamilton in all that he has said, and if they will be kind enough to express their opinions we shall be very glad to hear them.

Colonel GONNE, late 17th Lancers: There are many Officers present more fitted and more able to speak on this subject, but I will offer a few remarks just to raise a discussion. From what I have understood of the very able and interesting paper to which we have listened, the writer is in favour of meddling with our cavalry as to its equipment. As a cavalry Officer I object to that, because we own only a handful of

cavalry, which has done its duty fairly, though perhaps it might be improved. The writer also proposes to change the weapons of the different descriptions of cavalry except the Lancers and the Household troops. Now I consider that the Lancers and the Household troops ought to be the first "meddled with," because they are less useful for what I call general purposes. The Lancer is handicapped with three weapons—the carbine, the lance, and the sword, and it almost renders him inefficient. The Household troops are very good for special purposes. There are few of them, and they have been very usefully employed lately; but it is a question whether troops of that description could have stood a long campaign. If any cavalry requires alteration it is first the Lancer and then the Cuirassier. However, we have only got a small force of cavalry, and I object *in toto* to the cavalry being meddled with. Let us, therefore, rather turn to the question of how we are to supplement them. The greatest mistake would be to allow the infantry to suppose that they can be expected or intended to work as cavalry. I should give them, on emergency, a horse, which never could be called a charger. I should give them a horse of such a height that it would not be difficult to mount rapidly. I should certainly not give them a sword, and if the mounted infantryman had a sword the last place to which I would fasten it would be the saddle. The Russians have lately added fifty per cent. to their cavalry strength—they have turned the bulk of their cavalry into dragoons. They intend to have a strength of over 20,000 with which to make a raid. Dragoons will be armed, as the writer stated, with a rifle, not inferior to that of the infantry, and a bayonet. These men, when they parade before the Czar, dismount before they come to the saluting post, and march past as infantry. They are trained as infantry, and are going to be equipped as infantry, but they will not forget that it is necessary to have "overalls," which admit of the leg being thrown over the saddle—that is, not too tight. Our soldiers would probably suffer greatly unless we changed the equipment of the infantryman to make him able to ride. I have seen the Russian dragoons, and I have had the honour to report that they are about as useless a force as exists in that fine army. I have been also with infantry, during a sham fight between Russian dragoons and infantry, and the infantry Officers have turned to me and remarked, "I think, on service, that we should be able to get some horses for our men to ride"—meaning that the dragoons were never able to protect their horses, which were led by a few mounted men. If there is any kind of reverse, the horses fall a victim to the more skilled manœuvre of infantry. I do not think I need take up any more time. I sum up my remarks with the expression of hope that our small force of cavalry will be left as it is, and that in forming mounted infantry we shall use stuff which is proved good for the purpose. Let us train the infantryman to take care of the horse in time of peace, and to be able to ride him in time of war; and let us improve, more than anything, his powers of shooting, so as to make him a good marksman. Then, I think, we shall find that the fifty mounted infantry—(I do not think there were more)—who were so usefully employed in the Egyptian campaign, will have set a good example to a larger force, destined, perhaps, to perform great feats of arms in our campaigns of the future.

Colonel MIDDLETON: I am one of those many infantry Officers alluded to by Sir A. Herbert, who object to, or rather disagree a great deal with, what the lecturer has told us, and I feel rather inclined to begin by demurring to his assuming such superiority of intellect for the cavalry soldier over the infantry soldier. He certainly has arranged a very nice little sliding scale of intelligence, based upon the lace of his coat; but that would place, I am afraid, the Royal Engineers rather low in the scale, and the cavalry soldier very high indeed. I do not also agree with the idea that the infantry Officer is not equally qualified, if selected to carry out the duties connected with mounted riflemen, as the cavalry Officer. What the lecturer has been really advocating is the re-introduction of the old dragoons, a force which was tried many years ago, but which turned out to be excessively bad infantry, and very much worse cavalry. It was found whenever they were working that they had an irresistible inclination to work backwards towards their horses, which they were never happy until they had mounted, and then they generally got out of the way. The result was that they were gradually abolished. What I take to be the real want of the day is mounted infantry, and there I agree with the lecturer that the term "mounted" is rather a misnomer. I do not know whether it will ever be

quite as obsolete a term as a "horse marine," but it gives a wrong impression of the duties that are required from mounted riflemen. I do not exactly know what term should be used. The word "flying" was once used with regard to artillery; very light artillery was called "flying artillery"; but whatever they are called, they should be selected from infantry pure and simple. Not the slightest change should be made in their uniform; there is no necessity for it. The mounted infantryman should be simply taken off the parade ground, and put on to a cob, or a horse; not a button of his uniform should be changed, no lines should be given him to hold on his cap;—that is a peculiarity I have remarked, that whenever infantry soldiers are put on horses, the first things they want are cap-lines to hold on their head-dress, and then they want spurs, &c. The infantry soldier should be taken off the ground, as it were, and put on his animal, and he must be made to understand that he is not a cavalry soldier at all. The simplest way of making mounted infantry would be for every infantry regiment to have so many horses in peace time, and that the men should be selected as being picked shots, and if possible as knowing something about horses, and not simply for their smartness. I object to that word "smart," because you find sometimes an awkward-looking fellow who is a good shot and can ride, and I should select that man in preference to a much smarter-looking man of perhaps less intelligence, and who is not a good shot. These men should be taught by their own Officers. I would not allow a cavalry Officer to have anything to do with mounted infantry. There are lots of Officers in every infantry regiment who are perfectly competent to teach men how to ride. I do not want the infantryman to ride as the cavalryman does; I want him to ride decently, and to be able to go at any pace required, and that he shall fully understand that the animal he bestrides is simply a mode of locomotion,—that a bicycle or tricycle would be a much better one, only that it would not go over the ground which he might be wanted to travel over. It cannot be too much impressed upon his mind that he has simply a horse to convey him from one spot to another. The fact is, we have been using our improvised mounted infantry in our little wars as cavalry, to supplement our usual deficiency in that arm; and under the command, generally, of infantry Officers, they seem, I think, to have done even that work remarkably well. The lecturer, in the early part of his paper, referred to a question that would have to be put as to whether it was possible for cavalry to perform their own duty as they do now, and to substitute for (what he dislikes very much) the dismounted drill of the present, the duties of mounted riflemen, and he proposed certain experiments to ascertain this. I do not think myself that any experiment is necessary; and I think that when we consider the extra duties that will be demanded in future wars, and that have been demanded from cavalry, those duties being clear and quite distinct from those of mounted infantry, there is no doubt that they will require the greatest intelligence on the part of the cavalry, and I think most cavalry Officers will agree with me that the cavalry will have quite enough to do to accomplish that work alone (without calling upon them to perform other duties unsuited to them). If they do that perfectly and intelligently, I think it will be as much as any arm can be called upon to do, especially when we consider the fewness in number of our cavalry, and we never shall have a very large force of cavalry whatever happens. What we want is simply to be able to move a certain number of infantry rapidly from spot to spot. The want of this mobility is constantly felt on service. Even the young, untried Officers who have attended war-games must have remarked how the unfortunate slowness of the movements of infantry upsets the arrangements of the Officers who are conducting the war-game. I should say that every regiment should have at least thirty or forty horses in peace time; that a certain number of the best shots and most intelligent men should be selected and taught to ride those horses. Riding and stable management will be quite sufficiently taught by Officers who would always be found in every regiment. There should not be a button altered in the man's dress; he could ride perfectly well as he is. There is nothing better for riding in than gaiters, and he should be constantly drilled on foot just as much as the other men. Though I would form a company of selected men as mounted infantry, there is no reason why nearly the whole regiment should not gradually be instructed in riding in this rough way, so as to be able at once to fill up any casualties. I would have no swords or spurs, or anything of the sort. If the man

wants to make his horse go, let him take a stick and make him go. He wants to get to a certain spot, and when he gets to that spot he has to get off his animal at once. If this plan were carried out, every brigade on service would have 300 mounted men, and the divisional commander would find himself in possession of a very good force of not less than 700 men, who would be available and might be massed as in the old days, when they used to mass the flank companies. In this way the divisional commander would mass his 700 men, and he would have very little difficulty in finding a Commander, Majors, and Adjutant for them. There is one thing that has, I think, been overlooked, and that is, that the saddles should be made so that the man may take up another man *en croupe*. The lecturer mentioned one case in which a large force of men were sent forward by being taken *en croupe*. If some arrangement were made in the construction of the saddles, then on a pinch these 700 men could take each a man behind him for a short distance, and so the force of 1,400 men could be sent forward to seize a certain point in advance. Such a movement could be carried out with rapidity and with perfect ease. There would be very little trouble in holding the horses, because there would be few men required. The horses would not be very high-spirited horses, and I daresay they would stand quietly, almost by themselves. There is no doubt that being able to take a man easily *en croupe* would be a great advantage. I saw one remarkable instance of this myself during the Mutiny. I was then with Sir Henry Havelock, who was commanding a party of cavalry and some of the 10th Infantry. We were sent out to stop some Sepoys who were crossing the plain with elephants. The cavalry was not very good; it was improvised cavalry, and it did its best. We galloped on ahead, but found we could make little or no impression on the Sepoys: they formed square and killed a number of our men. We went through a part of them, but the troop Officer was badly wounded, and we had to halt. We then galloped back and met the 10th Infantry, who were coming on, and each took a man up behind him, Sir Henry Havelock and myself included, and of course, as you may fancy, though it was a short ride it was rather an unpleasant one, especially for the infantry. I remember well that I had the breath squeezed out of my body by a big corporal who held on like grim death, gripping me like a vice. The end of it was we rode up, turned round, dismounted the infantry, gave a very good account of the Sepoys, and captured the whole of the elephants.

Viscount MELGUND: I have seen something of mounted infantry, both at home and abroad, and I hope you will allow me to say a few words. I listened with great interest to what the lecturer said as to the absolute necessity of improving the shooting of our cavalry. No doubt they will be all the better for it, and, armed with a better weapon, it will then rest with their own Officers as to how much they will be employed for dismounted service. I do not think a corps of picked marksmen from cavalry regiments would in any way take the place of a mounted infantry corps. Mounted infantry I look upon purely and simply as *bonâ fide* infantry, and nothing else; and their horses simply should be a means of conveying them from one point to another in the theatre of war more quickly than they could go on their legs: that is the only reason that they are mounted at all. Part of the lecture points to the assumption that it would be a good thing to start a mounted infantry corps in time of peace. The British public, seeing the success of mounted infantry in Egypt, assumes that we ought at once to start a mounted infantry corps at home. I am thoroughly opposed to that. I think the result would be simply this—that you would raise a second-rate cavalry corps. Directly the infantry soldier gets on his horse his tendency is to forget he is an infantry soldier, and it is the same with the Officers. You want to keep them as purely *bonâ fide* infantry and nothing else, and I should be very sorry to see an attempt made to establish a mounted infantry corps at home. I think the success of the mounted infantry that we had in South Africa and in Egypt was chiefly due to the rough and ready manner in which those corps were started to meet the emergency of the moment. I am quite ready to say this, that if any corps had been thoroughly equipped in England, mounted on English ponies, and sent out with no end of paraphernalia, I would back the mounted infantry we had in Egypt to beat them out of sight in their performances. I am quite certain that a rough and ready corps mounted on the ponies of the country would always beat any corps we might send out with a large establishment of home-

bred animals. As to Officers, I must very much differ with the lecturer about the proper Officers for mounted infantry. Certainly the infantry Officer is the one to have, and the infantry Officer who has been accustomed to horses. There are plenty of them who are good riders, and understand stable management, and are fond of horses; they are the sort of fellows to have. If you employ cavalry Officers you only increase the danger of turning your mounted infantry into a cavalry corps. One thing that we found very useful in Egypt was this: we applied for a good non-commissioned officer from a cavalry regiment to assist us in stable management, and we found that he was very useful; but as regards the Officers in a mounted infantry corps I should stick as much as possible to infantry Officers. The subject of equipment is rather too long to go into now, but it seems to be generally assumed that mounted infantry should be supplied with a bucket for carrying the rifle. This is very doubtful indeed. Certainly the Namaqua bucket is a very good way of carrying the rifle, but it is very difficult to stop the men from dismounting and leaving their rifles in their buckets; besides, you may be taken by surprise, and there are your rifles in the buckets instead of in the men's hands. In Afghanistan a good number of carbines were lost from the horses falling on the carbines while in the buckets, and the men could not get them out. For mounted infantry the best place for the rifle is in the man's hand. In Egypt the men always had them in their hands; a few of the men who had been in South Africa had the means of slinging their rifles, but they never did it. I do not think that our experience in our late campaigns points to the necessity of raising a mounted infantry corps, or a corps of mounted marksmen, in time of peace.

General Sir GEORGE WILLIS, K.C.B.: I do not propose to take up much time, but I think those who have criticized the paper have been a little hard upon the lecturer. I think we ought to thank him for having brought the subject before us. I believe there is no disputing the value of mounted infantry, but they must be infantry,—there must be no confusion about it; they must be mounted infantry, who simply require horses as a means of locomotion that they may suddenly take up a position and hold it in advance of the troops and infantry. The cavalry have enough to do in their own particular line, and I hope there will be no half-measures, such as having half mounted infantry and half cavalry. As far as equipment goes the soldier simply requires to have gaiters and to carry a rifle in his hand, with the alternative of slinging it over his shoulder to rest occasionally, but it would not form part of the horse attachment in any way. Neither do I see that the mounted infantryman requires a sword; the weight on the horse would be much better taken up by carrying the reserve of ammunition which they ought to have. During the Egyptian war there was difficulty in keeping the mounted infantry supplied with ammunition when they were away at a distance; therefore, whatever weight can be saved from equipment I would give them in the shape of a reserve of ammunition, to be carried on the horse. I think if you give him a sword at all it should be simply a sword-bayonet, because that might be useful in clearing obstacles sometimes and making his way occasionally; but I think there should be no mistake whatever that he should be purely and simply an infantry soldier, armed with a rifle and mounted on horseback.

Captain Sir JAMES SETON, Bart.: I think the balance of opinion seems to be, with all due deference to the lecturer, that what is wanted is mounted infantry rather than that dismounted cavalry should do the duty of infantry. It is a curious thing that we have in the service a portion of our infantry differently clothed though armed the same as the rest of the line generally. Formerly, there were the old 60th Rifles and the Rifle Brigade, and to these have been added the Scotch and Irish Rifles, making in all twelve battalions. The 60th and the Rifle Brigade had their *raison d'être* in the Peninsular War. They were the only infantry trained for effective skirmishing besides the light companies of regiments. They used to do the light work of the army, and occasionally, from necessity, companies were combined into light battalions, as has been pointed out to us. Another point in connection with this subject is that the organization of the British division contemplates there being an additional battalion, sometimes called the rifle battalion, which remains outside of the brigade organization. My suggestion would be, as I believe the authorities look with favour on suggestions made in this theatre,

that the battalions of Rifles should gradually be experimentalized on, with a view of forming them into a permanent order of mounted infantry, and, as has been suggested, great care should be taken to prevent their degenerating into an inferior sort of cavalry. That would suit the financial views of the Government, inasmuch as there would be no necessity to horse the whole of them. If enough horses were provided to allow one company to practise at a time, and the foreign service roster allowed six battalions, there would be no greater increase to the Estimates than 600 horses on the home establishment. A certain number of battalions would be in India, and care should be taken that these should be quartered near the frontier, where there would be more likelihood of their getting practice in large assemblies of troops; and in the constant little frontier wars that are breaking out the military authorities would get experience in the use of that arm. I will not say a word about details, because I have not had the same experience myself as previous speakers, but I would just throw this out as a suggestion.

NOTE.—When I rose I had it in my mind to say that the men should be trained also to break young horses, so that, on our having to send an expedition abroad, the mounted infantry might be horsed on the theatre of war, and thereby sea transport be saved. I had also meant to express the hope that the remarks made by the lecturer as to his early career in the service might go forth as an encouragement to young men of good social position, who have strong military instincts, but find it hard to get through competitive examinations.

Lieutenant HAMILTON, in reply: We have been fortunate in hearing good specimens of the opinions held, to a great extent, by cavalry and infantry against the measures I propose. Colonel Gonne has represented the disinclination held by cavalry to be used on foot; Colonel Middleton and others have represented the disinclination of infantry to part with or even share with cavalry their *bonne bouche*. Colonel Gonne seems to think I wish to change cavalry to infantry. That is not so. I think they should do their cavalry work as efficiently as at present, simply improving their dismounted service. Colonel Gonne also does not approve of the lance. It is well known that many hold that the lance is the queen of weapons; in several cases of cavalry charging cavalry, during the Franco-Prussian War, wherever they met the sword invariably went down before the lance. With all due deference to him, neither can I agree that the Household Cavalry should be interfered with. A sufficient reason is simply that they are *Her Majesty's Body Guards*, and being the finest in the world should be left as such. As to their not being so useful as other cavalry, it is a curious though undeniable fact that, whenever they happen to be proved on service, to say the least of them, they are not found wanting. As I have previously stated I quite agree that mounted infantry should never be used as cavalry, and also, as I have said before, that I do not quote the Russian dragoons as an example for us, in any improvement we may make in our cavalry. I cannot think, with Lord Melgund, that the rifle should be carried by the mounted infantry soldier in his hand, dispensing with both bucket and sling; on many occasions these are almost indispensable; in cases of successive long marches and of a forced march it would be found most wearisome and unsatisfactory. It will be found that most of the objections made to the improving the dismounted service of our cavalry as I propose have been already dealt with in what I have previously said, so I will not occupy your time by further alluding to them. I wish to read a few remarks which have been sent to me—quotations from the *Times* and the *Saturday Review*. Mr. E. Maxwell Grant, in a letter to the *Times*, sums up his argument in favour of the system proposed by me thus:—"The speediest, cheapest, and best plan for providing the mounted infantry of the future will be to change armament and drill of the existing cavalry regiments into a homogeneous mounted force, which will combine all the useful features of the old cavalry organization with the new duties of the force universally admitted to be necessary for the armies of the present and future." The *Saturday Review* says:—"The equipment of cavalry will probably have to be modified in conformity with the requirements of modern war. The use of the carbine increases, while that of the sword diminishes. At present, as everybody knows, the trooper wears the sword while the horse carries the carbine in a leather case attached to the saddle. The result is, that if suddenly dismounted, the man retains the sword which is useless, while the horse

goes off with the carbine which is useful. Before long this will have to be reversed, on service at any rate. Whether 'the bold dragoon, with his carbine, saddle, and bridle,' will find as much favour with the fair sex as his predecessors who carried 'a long sword,' is a point which the rapid march of military improvement forbids us to discuss." I am sorry no one has said anything as to whether it would be advisable for cavalry to use the bayonet for their dismounted service; but I wish to add one reason why they should. Without quoting the many circumstances under which a bayonet is necessary to soldiers armed with a rifle fighting on foot, I would keep the bayonet for the fact that, though it may justly be said that the number of men killed with it, in comparison with the casualties otherwise caused, is small, its moral effect is incalculable. Men fighting on foot, armed with a rifle only, doubly invite the attack of an enemy. They at the same time find themselves deprived of a weapon which naturally inspires men with confidence: thus the enemy are emboldened while their *vis-à-vis* are disheartened. The situation is enough to make the boldest cavalry look over their shoulder for their horses. This is the very thing that we want to prevent. The reason cavalry do not often appear to advantage when fighting on foot is because they are encouraged to consider themselves dismounted cavalry; they should be taught complete independence of their horses when on foot. They should be taught when mounted to trust to their sword, to remember only the *rôle* of "the Dashing Hussar." Once on foot they should leave their sword with their horse, and grasp with confidence the arm *par excellence* of the foot soldier—the rifle and the bayonet, breech-loader or muzzle-loader, magazine rifle or smooth-bore; a soldier, cavalry or infantry, fighting on foot, should always see a glistening piece of steel at the end of his shooting-iron, and be taught how to use it when opportunity offers. As one of the objects of the meeting is discussion, I should be very glad if some Officers would give us their views on that subject.

Colonel MIDDLETON: As far as the bayonet is concerned, there can be very little doubt, if cavalry are to be armed with the rifle and fight on foot, they should also have the bayonet,—that, I think, there can be very little doubt about.

Colonel MALCOLM GREEN, C.B.: I should like to say one or two words on that subject. The awkward time for a cavalryman is after a charge has taken place against footmen, and the latter, though broken up as a body, do not happen to run away; the trooper then finds it difficult, with his sword only, to prevent himself and horse from being mobbed by half-a-dozen men armed probably with sword and shield (in the East). He cannot, under these circumstances, use a long rifle from horseback to keep the fellows off, but he can easily manage and do considerable execution with a short breech-loading carbine. I am therefore an advocate for keeping the latter weapon for cavalry.

The CHAIRMAN: In asking you to thank the lecturer, I will make a few remarks. As an official, you will understand that I must consider the financial aspect. The lecturer proposes to establish three corps, taken from the cavalry, of 600 men each, 1,800 men in all—a force equal to four of our cavalry regiments on the peace establishment; 1,800 picked men, taken from the cavalry regiments, would destroy the efficiency of far more than ten regiments. What will the Officers of the cavalry regiments say to such an arrangement, taking at least a squadron of picked men from each regiment? Therefore I do not think such a plan could possibly be adopted. As for the Government authorizing the raising of three more strong cavalry regiments, any one who knows the economical view of a Government, whether Conservative or Liberal, will be perfectly sure that scheme would never be carried. I think the lecturer is quite right in upholding his branch of the Service—the cavalry. There is no doubt a great deal more may be done by cavalry Officers instructing their men in dismounted duties. I have, however, seen cavalry regiments myself, when in command, which drilled remarkably well dismounted, and did everything our lecturer wishes them to do. They certainly did not kneel to fire, of which he complains; the paragraph to which he alluded was inserted in the Regulations because the cavalry wore spurs, and it is very awkward to kneel, resting the body on a heel which has a long spur in it. It is not intended the cavalry should not when firing take the same aim as the infantry, but the cavalry soldier wears spurs which he cannot take off when he dismounts, and therefore

some alteration in the position was required. It would be invidious to mention regiments, but one regiment that I saw drilled and skirmished excellently on foot. They did everything an infantry soldier could be called upon to do, and certainly as much as cavalry can be required to do dismounted. I entirely agree with Lord Melgund in what he said—that we do not want what we may call bastard cavalry, fellows who cock their hats on one side and strut about, neither real cavalry nor infantry; though I do not agree with Colonel Middleton that you should take the infantryman from the ranks, and put him on his horse at once.

Colonel MIDDLETON: I say he should be taught to ride.

The CHAIRMAN: I mean to say in his infantry clothes; for I should like to know what his feelings would be if, without a pair of drawers, he was taken and made to ride for a long day in a pair of infantry trousers and highlows. He would feel very sore and uncomfortable, I imagine. The mounted man must have breeches or something of that sort; he must have a dress in which he can ride. I do not think a man will put his spurs in his wallet when he dismounts, as some one has suggested; if he has spurs, he must dismount and skirmish with them. I know the American army pretty well. The American cavalry, so called, were nothing but mounted infantry extemporized. They were mounted troops: they rode—not very well. Americans are not like Englishmen, who are always accustomed to riding: these men had been drilled but a short time, and yet they were able to move in large masses; they fought as often on foot as mounted. We must have a nucleus of mounted infantry in England, if we wish to have them ready for war. I mean that we must have a certain number of men who are trained to ride, and they must know some little about stable management. The greater part of the mounted infantry in Egypt had a short training at Alexandria before Lord Melgund joined them. When they were at Alexandria they worked hard and learned something: the men who knew a little about horses were selected. What has been advocated by the authorities is to have a few horses, or ponies, or mules—anything that can carry a soldier,—at Aldershot, and at the Curragh, in order that the men can be taught to ride—taught just to move more sharply from one place to another, dismount and fire, and leave their horses in charge of a very few men. That, I believe, is all that is required, and that is all we are trying to get at the present time. I do not think the principle our lecturer advocated, of borrowing horses from the cavalry regiments, would at all suit the cavalry Colonels—to see an infantry regiment march into their stables in the morning, take possession of their horses, knock them about all day, and bring them back saying, "Now, gentlemen, there are your horses." Imagine the Colonel's feelings! I am afraid it would not answer. I think, however, we ought to be very grateful to our lecturer for having brought this subject before the public. He is quite right to uphold his branch of the Service, and to try and make them as perfect as he possibly can. I beg on your behalf to tender him our very best thanks for his very interesting paper.

Friday, March 2, 1883.

LIEUTENANT-GENERAL SIR ARTHUR J. HERBERT, K.C.B., QUARTERMASTER-GENERAL, in the Chair.

SUGGESTIONS ON THE TRANSPORT OF THE FUTURE.

By Lieutenant-Colonel C. E. WEBBER, C.B., R.E.

IN attempting to put on paper the few remarks I shall offer to-day, I was already aware that the military literature on the subject of Transport is extensive in proportion to its importance; but when it became necessary to examine the writings which, in the past, had been laid before the members of the Institution,[1] their extent was realized for the first time, and the task entailed by that examination proved much heavier than might be anticipated. Increased, when it is understood, that in spite of the compilations of one or two very able members, there exists a certain amount of information which has not yet come within easy reach.

The difficulty in subjecting such redundant material to any complete analysis lies chiefly in the existence of—

(*a.*) The endless narrative of the Transport operations in past wars, and the consequent variety of the recorded experiences.

(*b.*) The wide difference in the impressions received by the various writers, each drawn from the practical experience reported in those narratives, under various conditions.

(*c.*) The divergence in the conclusions drawn, by many in high authority, from their own experience and that of others.

I do not pretend to steer my audience over such a sea of conflicting statement and opinion, but only to refer here and there to the work of my predecessors in the subject. Vast trouble has been taken by them to bring together and compile valuable information and facts.

[1]

Name of Author.	Volume.	Number.
Wingfield, F.	13	55
Beazley, G. G., Captain	13	56
Collen, E. H. H., Lieutenant	16	68
Parsons, Clifford, Lieutenant-Colonel	23	102
Geddes, W. L., Captain	24	105
Dean-Pitt, D.C., Lieutenant	24	106
Shaw, Wilkinson, Lieutenant-Colonel	24	106
Heyland, A. B., Major	24	107
Salis-Schwabe, G., Lieutenant-Colonel	24	108
Shervington, C. R., Colonel	25	109
Hildyard, N. J. T., Lieutenant-Colonel	26	118

It would be absurd to claim originality in speaking on a branch of the military art which, the more it is followed up, the more evidence appears of its having been thoroughly "thrashed out" by the industry of others.

It seems to me, that, all there is left to be done, is to enlist the judicial mind of my hearers in the consideration of a few leading features of the subject, and to suggest conclusions which may form fit matter for discussion.

I would venture to suggest that if any discussion does arise, the speakers may confine their remarks to those portions of the subject which seem most to require settlement, in such a way, as to give all the assistance possible to those who have finally to decide for the future.

The study of what has been done in the countries from which we are ready to learn, brings out more plainly than ever that here we have the prejudice of official routine and vested interest to overcome by weaker means than they possess. In this condition I do not include India.

Every writer complains that we have not availed ourselves of our frequent experiences. Lieutenant-Colonel Furse leaves it very clear to his reader's mind that, in spite of Committees and repeated experiences, "no real steps are taken in peace to remedy the faults and shortcomings which have occurred in war." Perhaps they overlook that the frequency and variety of these experiences may be the very causes for hesitation.

There are some points which must be ever present in our minds if any good is to arise out of a discussion of this sort. One is, we must subject every recommendation to the test of cost. Every War Minister must reject any scheme which materially increases the Estimates. At the same time what the country wants is finality, and we believe it will stand a certain outlay, if that can be secured.

How is finality to be secured? Did the establishment of the French system of *Intendance* secure it in that country? Did the Control system give us an abiding organization of Army Transport? Has the present Supply and Transport Department satisfied everyone? Did the two most efficient transport systems that modern times have witnessed, viz., those of the Federal Army in the American War of Secession, and of the Germans in France, spring out of analogous institutions or procedure? Does not the question present itself to some minds here at this meeting as follows? Does the experience of our present system show that we have any secure and lasting basis to build upon, except for the energy, intelligence, and devotion, of the individuals whom our late wars have brought to the front?

And, further, can it be said that the *matériel* of our regular Transport is suited to the wants of an army operating beyond our own shores; more particularly when such a question is put, after drawing attention to the experience of wars during which we have used every kind of vehicle except those made at Woolwich?

I cannot too early recall to my hearers the description of our present Transport Branch given here by Lieutenant-Colonel Clifford Parsons

in June, 1879. I will just remind them that he tells us the 16 companies on the peace establishment are intended to be expanded into 32 for war. Their strength, which varies between 182 and 230 of all ranks, working 83 to 127 carriages each, or, at an average of 206 individuals and 105 carriages per company, give an available total in war of 3,360 carriages, worked by 6,592 of all ranks.

I will ask any Commissariat Officer here to-day to be kind enough to tell us presently: how many of the sixteen peace companies took the field with the late Expedition to Egypt; with what strength in rank and file; what number of carriages the Transport sections of those companies were capable of working; how many Transport men were, at home or abroad, available to reinforce them; and, lastly, how the Department proposes, at least on paper, to effect the expansion described by Lieutenant-Colonel Clifford Parsons.

While appearing to challenge the efficiency of what we have, it is but fair to give its friends the opportunity of stating all the advantages of which it can boast.

I will now ask my hearers to venture with me into the arena where the differences between the contending parties have been put to the test; and, where the advocates between supply or subsistence, and transport, being under one control, and its opponents, have fought out their opinions.

If I go back to the account of Lord Strathnairn's Committee, I will do so now to an attached Report,[1] on the subject of Transport, signed by Lord Airey, Mr. Godley, Commissary-General Smith, General McMurdo, and Lieutenant-Colonel Woodhouse. In this most important document is found no hesitation in reporting "that the balance of advantages, as well as of authorities, is in favour of a Department of Transport, organized on strictly military principles, placed directly under military authority and discipline, both in war and peace." They add, "not to be amalgamated with the existing organization of the Commissariat Service, so as to place the Commissary-General at the head of it, or to make him responsible for its efficiency," and that "although the Commissariat requires a very large proportion of the Transport of the Army[2] in war time . . . . . there is nothing in the special duties of the Commissariat to give it any peculiar claim or qualification for the organization and management of a corps of military drivers."

Only two years ago a lecturer in this theatre, Lieutenant-Colonel Shervington, wound up a *résumé* of the result of the work of Lord Strathnairn's Committee, by saying—"Thus had army transport become subservient to other interests than those which had been deemed essential to secure its efficiency." This may fully account for the oblivion into which the document, the signatories of which I have detailed, has fallen.

Those who have studied the general report and evidence of that

[1] Appendix XV, E, "Report on the Provision and Management of Transport of an Army in the Field."

[2] A proportion very much reduced when forage is left out of the calculation.

Committee, and who understand the working of our public Departments, cannot differ widely from Lieutenant-Colonel Shervington in his conclusions that the literal effect of the measures taken to carry out its recommendations, was *very* different from the views expressed on that part of it which refers to Transport.

The great measure was the establishment of the Control Department: under which the Committee recommended the transport should be placed. The proviso that it should be of a military character, under military subordination, produced no change, because the Control simply meant, previously existing organizations under a new name. No fundamental change was made, and to all intents and purposes the Army Transport service of to-day differs in very few respects from the much-abused Military Train, except that it is what some people delight to call less military.

The Army Service Transport, which went to Natal in 1879, was only less military than its predecessor, in that, exchange, purchase, and a few so-called cavalry characteristics, had disappeared.

The *real* Transport of the Army in that country was the creation of a few energetic men, many of whom had been brought up, or had served at one time or other, in the Military Train, and who simply disregarded all that had been organized by their own Department in time of peace.

Its success, to my knowledge, was largely due to what may be called the military element brought into it from all sides; especially that part which was the result of a measure suggested by Sir John Power in 1867, and carefully worked out and carried into effect by my friend Commissary-General Watt. I refer to the accession of a number of the best non-commissioned officers of the Army in the capacity of Quartermaster and Conductor.

Before I leave the subject for the present, I wish to add, that, to this resuscitation of the military element in the shape of the highest type of military supervision procurable in the Army, by the tempting offer of the posts I have mentioned, I attribute, what Lieutenant-Colonel Shervington would, I imagine, call the salvation of the Transport and Supply Departments of the Army from radical separation.

The experience gained in the American War of Secession commends itself, as also giving practical instruction, all tending to clear the atmosphere of discussion on this subject of organization.

The races engaged, the variety of country and climate, the rapid expansion from the most meagre peace footing, are circumstances very analogous to those in which we exist.

Any student of the history of those wars will concede that all the organization was essentially practical.

The Quartermaster-General's Annual Reports of 1862, '63, '64, and '65[1] give the most detailed accounts of the work done. The experience produced shows a steady improvement in results, until, at the

[1] Printed at Washington Government printing office, in 1880.

end of the war, the Transport Service may be said to have almost reached perfection.

In the present Regulations[1] of the Army of the United States one can clearly trace the results of those experiences of seventeen or eighteen years ago. For instance, the lessons learnt and applied in the working of their Quartermaster's Department in their great war, instead of causing desire for change, or for some new experiment, have confirmed that Department in all its transport functions.

Surely we ought not to pass by and leave these experiences unapplied to our own circumstances.

We find the Quartermasters of battalions, brigades, and divisions, and a Quartermaster-General of an Army. His prime responsibility in war is for Transport.

He has nothing to do with subsistence except to see to its transportation.

The Quartermaster of Transport receives stores, subsistence, or cash into his charge, and such articles are deemed to be *turned over* to transportation when requiring to be removed.

Under Article LXXX of the Regulations, the Subsistence Department is described, and it is charged with the purchase, issue, or sale of all articles of human food, and the Officers are called Commissaries.

The only means of subsistence for which the Quartermaster is responsible is forage.

The Quartermasters of Trains command and conduct them; when several trains march together the Senior Quartermaster takes command. But if a train is under special escort the Commander of the escort takes command of the whole.

With the Army of the Potomac, which began the campaign in 1864, and numbered 125,000 combatants, the Chief Quartermaster had under him 4,300 wagons, 835 ambulances, and had to forage an aggregate of 56,500 horses and mules, which latter included the cavalry and artillery.

The Regulations I refer to lay down minutely the amount of transport to be assigned by the Chief Quartermaster to each unit, down to so small a one as of two Staff Officers detached alone.

The proportion assigned to the Subsistence Department and to the Reserve Ammunition is also carefully detailed.

In the war, all the military drivers and their non-commissioned officers belonging to the transportation trains were armed and equipped, so that special guards were rarely required.

To Lieutenant-Colonel Hildyard the Institution is greatly indebted for his compilation on the Administrative Departments of Continental Armies, published last year in the Journal, and I propose to interest you a little more in this question of organization, by referring to some facts given by that Officer.

[1] United States Army Regulations and General Orders in Force on the 17th February, 1881; for copies of which I have to thank my friends Commander Goodrich and Lieutenant Theo. B. M. Mason, of the United States' Navy.

His clear description of the German Train Battalion system, describes the Military Transport Service as a special branch, "having a strictly military organization, with the command of which the Intendance has nothing to do."

The peace establishment of the Train Battalion of one corps, consisting of two companies, composed of 10 or 12 Officers and over 200 non-commissioned officers and rank and file, expands when on a war footing to—

2,238 of all ranks.
611 wagons.
2,216 horses.

For the whole Army, the peace establishment of 5,040 of all ranks, and 2,457 horses, expands to 39,236, and 46,017, with the carrying power of 12,584 wagons.

This regular Train is assigned by regulation to the different units, according to their necessities, the Supply Branch receiving so many columns for the transport of provisions.

It is interesting to note that of the total of 1,760 carriages and 6,500 horses forming the total transport of one Army Corps, about *one-third* are assigned to the Commissariat.

The Army Corps Train is under the command and conduct of the Senior Officer of the Train Battalion.

Lieutenant-Colonel Furse, in dealing with the question of Administration of the Transport Service, does not appear to have himself arrived at a clear and definite conclusion.

He describes, how, the advocates of what is called the purely military Direction have come to the conclusion that want of experience in time of peace has made it necessary for the Transport Service to resort for assistance and even for administrative ability to the general body of Officers in the Army; and, how, the Commissariat considers that the failures and shortcomings in war lie only at the door of defective organization and deficient means in peace.

Of which side is right Lieutenant-Colonel Furse has not recorded his opinion, but he is definite enough in his insistance on *preparedness*.

Like most writers, he splits on the rock of reconciliation of the conflicting conditions in peace and war. He allows the probable success of there being one administration for supply and transport, but insists on a separate executive. He says: "The Officers of the first, confining themselves solely to supply, of the second, purely to the work of carrying, the same Officers not having to attend to both duties, and carefully abstaining from interfering in controlling the branch to which they do not actually belong." With him Lord Wolseley "*rather concurred*," when he spoke in this theatre in 1881, and added: "I think it is impossible in war to dissever transport from the supply services;" but continued "in working these two services together I would keep their functions as distinct as it is possible to do so."

Lieutenant-Colonel Furse's division of the duties is described by the

following: "The duties of the two branches are thoroughly different," and he accentuates the distinctions between them so much, that a reader would suppose that there can be little advantage in their being even under one head. It is even not quite certain whether the head he advocates is the Commissary-General, the Chief of the Staff, the Quartermaster-General, or a General of Communications.

Lord Strathnairn's Committee saw the great truth which coincides with Lieutenant-Colonel Furse's apparent conclusion, and gave birth to the Controller.

That Committee had a glimpse of the *true* solution which late experiences have rendered clear. But so rapidly was it obscured, that we find Colonel Clifford Parsons, in this room in June, 1879, after recapitulating the arguments in favour of supply and transport being under one head, drawing the conclusion that the simple separation of the Store Branch from the Control, meant a conviction that the Supply Branch, or Commissariat, should remain in control of everything else.

That *truth* was clearly described in this theatre for the first time, I think, by Lord Wolseley (then Sir Garnet) in 1881, when he said: "I have no hesitation in saying the man who should be held responsible for feeding an Army in front, should be the Officer in command of the line of communications," and "that it is only possible in that way to get over the friction which will always exist between the various departments of the Army," and "it is necessary, in my opinion, that all these departments should, like the strands of a rope, be brought together, as they would be under the Officer in command of the line of communications."

Here we see the resurrection of the spirit of Control under a new name, with attributes extended beyond the dreams of its authors, but *limited in duration to war time.*[1]

Under this Head we can concentrate supply and transport, on mobilization. At his side will be the Commissary-General of the Army instead of at the tail of the General-in-Chief. To him will be attached the directors of land, water, and railway transport; and every indication of the duties of these departments and of mutual help, will be given by this "*Man of business*" of the Army.

This clear demonstration of duties will lead up to the long hoped-for disappearance of the unwieldy mixture in one man of Staff and Executive functions, and the irresponsible responsibility of departmental staff will be a thing of the past. There will no longer be a plea for the retention at the side of the Commander-in-Chief of Commanding Officers or heads of departments. Those who surround him will be Staff Officers pure and simple.

The "*business men*" of the Army will be under one head and free to devote themselves to the work for which they are responsible, and they will be directly under the chief "*business man*" of the Army, whose duty it is to relieve the General Commanding of all details.

[1] I cannot too strongly impress my belief that the Department of the General of Communication should have no existence in peace, and that it should be created for each war when the want arises.

A result will be, that *the transport which moves with the units of the Army, call it regimental or brigade, can be on the smallest scale, because the chiefs of supply and transport will be in honour bound to push forward subsistence as near as possible to the mouths of the consumers.*

All feeling which may exist in the Commissariat against irresponsible superintendence of their work will disappear, because their General will not have his attention necessarily centred on the enemy.

The title given to the Administrative Chief referred to, when first employed in Natal, Zululand, and Transvaal in 1879, namely, "Inspector-General," was misleading. An inspector inspects the command of others. It is not the title of an Administrator. Towards the end of 1879 he was confirmed in the functions of command which he had exercised all along.

In Egypt the title of General of Communications was at once conferred on the Officer holding the office.

These two instances are remarkable examples of the difference in scope of the duties falling to the lot of two Officers occupying the same office, and may fairly be quoted as examples which prove that all rules for the guidance of their command, laid down in time of peace, must be tentative.

In Africa the administration of an immense transport, distributed over many hundreds of miles of line of communication, came entirely under Major-General Sir H. Clifford during the last half of 1879. In Egypt the road transport may be said never to have worked under Major-General Erle. In the one case, the whole transport service was created by the war (army service wagons being too few to count), and it was never more efficient than when it came to be broken up. In the other case, it was the best that the Commissariat peace organization could bring to the front, and it was only subject to severe strains during three weeks.

While the principles of administration will remain the same, the details of working will all differ under the influence of, strength of army, length of communications, activity of the enemy, and resources of the country.

In colonial wars, or in countries wanting in supplies, the regimental transport will work as close to the consumers as possible; its duties, as in Zululand, may be confined to carrying a reserve of subsistence, only to be used when the supply cannot reach them.[1] In a rapid move over a short distance, as in Egypt, the regimental transport may have, on the other hand, to take the largest share in distribution.

In a European war the system elaborated by the Germans, namely:

1st, of depending on the country supplies obtained by cash payments for the first day or two; next, on the Intendance for supplies brought from the base, or, in default of those being up, on the Corps provision columns; and, lastly, on the reserve of compressed food carried by the men or by the regimental transport: would present

[1] The Field Force Regulations gave two ox wagons, nominally carrying 4,000 lbs. each, to every company of infantry, and, in proportion, to other arms; as the General Supply Transport accompanied the columns, this was greatly in excess of actual needs.

quite a different mode of procedure for the administration of a General of Communications and his departments, *and especially for the application or distribution of the means of transport available on mobilization.*

But in all these examples the expression "line of communications" defines better than ever, so long as its margin is elastic, the difference between regimental or brigade transport, including ambulance and ammunition, and the general transport of the Army.

Very lately Lieutenant-Colonel Hildyard's interesting contribution to our Journal has clearly described a condition connected with the movements of an army as old as war itself, namely, how the key to the reduction of transport moving with the field forces lies in the system of drawing in the first instance on local resources.

His description of the German arrangements is well worth perusal, and shows how the regular supply of the soldier is assured under all but most exceptional circumstances.

How, after the country is exhausted the troops can be separated from all but their regimental transport for three days, and with their proviant columns from their communications for seven days more.

That these arrangements made in time of peace are liable to dislocation in war was often exemplified in Germany, but their peace manœuvre practice has always been used to give the troops experience in the most difficult part of the application of the system, namely, *the distribution and use of the reserve food which is already in their charge.*

It may be worth dwelling on how far any experiences our troops have at home in peace resemble the conditions lately encountered in Egypt.

The effect of the separation of the brigades of the 2nd Division when the flank move was made to Ismailia, showed how easy it is to upset arrangements for supply and transport made suddenly out of an unsuitable or inelastic peace organization.

Apparently the intention in England was to make the Division the unit, and all things were settled with that view.

The actual case was, that in one sense, the supply and transport services of the 2nd Division may be said to have never assembled.

In the first place, it was embarked in vessels the sailing of which was not connected with that of the transports conveying the divisional headquarters and the troops.

As they arrived they were sent on to Ismailia from Alexandria, thus being more distantly divorced from their unit, one brigade of which remained at the latter place, and picked up supply and transport where and how it could.

The other brigade remained in its transports in Lake Timsah, while the supply and transport services destined for the Division were almost dissipated in the *mêlée* of demands arising out of the wants at the base and on to Kassassin. In fact, the Highland Brigade, instead of having all the Division transport at its service, was mostly served by its regimental means, until the arrival of the battalions at Benha, Tantah, and Belbeis.

On disembarkation at Ismailia the regimental wagons carried the

food of the brigade to meet its wants to the 11th of September inclusive. For the 12th and 13th it drew rations from the Kassassin depôt, so that the Commissariat Staff of the Division was occupied chiefly in supervising the distribution, in other armies a regimental duty.

The Commissariat and Transport Corps Company allotted to the brigade, *should* not have been required with it, but *actually* supplied a serious and unforeseen want. The transport of No. 11 Company shared the loads of the regimental transport on the march of the 10th, and carried many footsore and exhausted soldiers on the 11th of September.

In the next operation, which followed the Battle of Tel-el-Kebir, the three sections of No. 11 Commissariat and Transport Corps Company, forming what might be called the provision train of the Highland Brigade, succeeded in transporting 11,000 rations from Tel-el-Kebir to Zagazig. The troops carried nothing to speak of, and these rations, intended for the 14th and 15th, were only brought with the help of camels captured from the enemy, and, I believe, the only vehicles taken on that march by the column were Maltese carts.

From Zagazig on, the transport ceased to be regimental or divisional, and marched as one column by road to Cairo.

If this brigade had had regimental transport suitable to the desert, capable of carrying three days' rations, and its brigade provision column with four days' more, it might have been independent of the services of the Commissariat, except at the advanced depôt, and have always had three days in hand, to say nothing of the local supplies actually purchased in Zagazig by the Commissary of the Division.

The fact is, the weight carried by road or with the troops was quite insignificant in comparison to that forwarded by railway, or even by canal. The circumstances of the campaign were so far exceptional that the military transport was called on to perform in it but a very minor *rôle*. This should be distinctly understood, lest it become a matter of uncontradicted assertion that the experience gained proves anything special in favour of our present system.

If anything has at last become a matter past discussion, it is, I believe, that the regimental, medical, and ammunition transport, shall not in future be a Commissariat organization in the British Army.

Lieutenant-Colonel Furse and every writer I have consulted agrees in this; but the Commissariat will tell you that *their* connection with the transport employed for all subsistence and stores must be closely maintained.

Let us consider what arrangements each view of the subject entails, and begin with the latter. The first thought of the Commissariat must ever be the transport of that for which they are primarily responsible in peace, and that is *food*. Can they ever help looking ungrudgingly at those wants which *must* have the first claim, namely, regimental, medical, and ammunition?

If the only transport having a military organization which we possess in peace is controlled by the Subsistence Department, does it not stand to reason, that, the necessary assignment of most of it to the area of

operations with which the Commissariat has least to do, must render both it and the department to which it has belonged inefficient at a most critical moment?

Our existing peace establishment is evidently so curtailed that if the three wants, I have mentioned, of a full army corps are *well* met, nearly the whole available means *must* be so assigned. Supposing such to have been done, and many of the best Commissariat Officers, non-commissioned officers, and men, practically separated from their Chiefs in time of peace, whom they know, and under whom they would wish to distinguish themselves, will the superior Officers of the department be happy in having lost the services of the best means on which they rely for the far greater task of raising and organizing the general transport required to move their supplies? And will they care to devote the further labour necessary to keep up the efficiency of that part of the transport, which, being exposed to the heaviest wear and tear, requires in consequence the most vigorous maintenance? While human nature is, what it is, such an unnatural procedure cannot be expected and will not result.

Mr. Parkyn, Deputy Superintendent of Stores, in his evidence before Lord Strathnairn's Committee, in November, 1866, describes the division of transport into "combatant or light" and "non-combatant or heavy;" the former he places as forming an integral part of the field army. We find the instance of Artillery and Engineers maintaining their own transport, in peace, quoted by many as a reason for the establishment of a third nucleus for military transport, viz., Army Transport.

The principles on which these are maintained, or will be maintained in future, are equally applicable, namely, large reserves of locomotive *matériel*, small cadres of *personnel* and animals.

I will at once turn to my friends in the Commissariat, and ask them to face what such a proposal means:—

Army Transport, on a purely military footing, combatant in every sense of the term, stationed at our camps, the consequent diversion of funds and appointments now administered by that department of the War Office.

The probable performance by contract of all other carriers' work at most garrisons, with a consequent saving, which would go some way to cover expenditure elsewhere.

The loss to the department of a means of training Transport Officers and men, a means, which, as I have shown, must at present be but very partially productive to the Department itself.

It also means, that when war breaks out, the labour of finding transport for the three needs I have mentioned will not fall on the Commissariat; they will only have to be told, according to the nature of the country and the campaign, *where* the margin of their duty will lie, beyond which they need have no care for transport with the Army.

It is quite certain that all concerned will be favourable to that margin lying as close up to the Army as possible, and, to the point of distribution being as coincident as can be with the point of exchange, between, the supply and subsistence service, and the Army Transport.

If the Commissariat sees its way to the remunerative employment in our garrisons in time of peace of the nucleus of a *general transport*, another wise measure of great utility is open to consideration, but I myself am more sanguine of the success of the department if it turns its energies to the perfection of arrangements for rapidly placing a purchased or hired transport in the field when wanted.

I was employed in such an operation previous to the Abyssinian War, and was much struck with one or two facts affecting this view. One was the complete absence of information of any practical value on the subject of the best way of rapidly procuring transport mules in Turkey in Europe and in Asia Minor, without indulging in extravagance; and this absence was acknowledged by the War Office, although twelve years before our Commissariat agents had overrun those countries for the same purpose.

Although the operation I refer to, which was directed by Colonel Clarke Kennedy, concentrated 10,000 mules at Suez, well within the time specified by the Indian Government, my private account of my own share led me to record that any one previously furnished with the experience I had gained at the end, could have procured the 900 mules and 600 horses which were purchased under my supervision in half the time.

Our more recent purchasing experiences in North and South America should enable the Intelligence Branch of the Commissariat to be in a position at any moment to say where animals, wagons, and harness, can be bought up, and how transported, in a very short time.

But if we can have such information accessible, as regards foreign countries, how much more ought we to have it compiled, and the records kept up, as regards this country: so that, if it came about that we had to operate in a country where our English wagons and carts could work, we should be in a position to buy what we want in the most inexhaustible market of the world.

I have mentioned the Intelligence Branch of the Commissariat as if it was existent, but of that I am not in a position to assure the meeting; if it is not, it seems to me, that its absence should be a far greater cause of self-reproach to that department, than if it was to lose the control of the purely military transport of the Army.

The restrictions of the area of control and direction of transport by the Commissariat, already sketched out, will, if established, be the means of doing away with, what I am glad to find Lieutenant-Colonel Furse also agrees to, namely, the expression of *non-combatant* applied to any Officer holding Her Majesty's commission. The area mentioned will be, *that* under the command of the General of Communications, whose Staff, Chief of Departments. and subordinates, can seldom have a claim greater (or less) than the Commissariat to be considered combatant.

However heterodox the idea may seem to received doctrines, the classification of combatant and non-combatant commissions *must* cease in time. Its consequences *must* be faced, and provision made for the custom of the Service as regards *command* being regulated, so that no risk can be run through the inexperience or unfitness of an individual

(to which every branch of the Service is liable) for such a position, if in the service of a line of communication the necessity should arise.[1]

Some Transport Carriages.

All evidence at my disposal points to four-wheel carriages being the staple means of military transport. Of known forms we have—

(1.) The general service wagon with and without springs.

(2.) The large American buck wagon as used in our South African mule train.

(3.) The Western American mule wagon of two sizes, as made for the United States Army.

(4.) The German proviant wagon.

(5.) The ordinary country wagon used in Continental Europe.

The general service wagon[2] of the newest pattern is built strong enough for what the Official Treatise on Military Carriages describes as "*not to suffer from the twisting strains.*" In other words, it does not yield to the necessary strains when the wheels are at considerable differences of level. To procure facility for turning in a small circle, and at the same time stability, a large floor is obviously necessary to save height of load, hence additional weight in the structure. It is a well-constructed wagon capable of carrying heavy weights on good roads, but it is *not suitable for* the general transport of the Army. It is perfect for parade purposes, and for showing-off equipment, but much too "fine" and costly. I know that the present Commissary-General, Sir Edward Morris, is strongly of opinion that immediate steps should be taken to replace or largely supplement it by some suitable conveyance in two or more sizes.[3]

Practical experience of the wagon was afforded by the nature of the work done between June and October, 1879, by a company of the Army Service Corps, stationed at Landman's Drift.

In the neighbourhood and within three days' march were twelve military posts,[4] where supplies were stored, so that when detachments were employed between one post and another, only food and forage for the intermittent halts had to be carried. But when transport was required for longer distances, on roads where no supplies were stored, the General Service wagon could not be used, as the space left by the rations for load was so reduced that it became absurd to despatch so large a body of horses and men to achieve so little. Besides, owing to

[1] This view is opposed to the idea expressed in one part of the Report of Lord Strathnairn's Committee, viz. :—

"That the Officers of the Army Transport shall have military command limited to their own corps, and should not be employed on any duty unconnected with transport."

This expression of opinion should not debar Officers of that branch from qualifying in other duties by the same roads as are open to Officers of other branches.

[2] Content of body, 59 cubic feet; content up to the bales, 120 cubic feet.

[3] The Woolwich wagon was described by Lord Strathnairn's Committee as built more after the system of Ordnance carriages than that adopted by public carriers.

[4] Ladysmith, Dundee, Newcastle, Utrecht, Baltespruit, Conference Hill, Koppe Alein, Fort Newdigate, Fort Cambridge, Rorke's Drift, and Helpmakaar.

the deterioration of the animals, the total load rarely exceeded 10 cwt., and two days' rest in seven had to be allowed. The headquarters of the company had to remain stationary, as it soon largely comprised dilapidated animals and material.

The *primitive* wagon, as I shall call it, is one of which the characteristics are met with in all Continental country four-wheel carts, which have formed for centuries the chief means of Army transport in Europe. These characteristics are bulk of load obtained by *length, not* by widening the floor, stability by keeping the load as *near the axle as possible;* elasticity of structure, by *absence of rigidity* in all joints and connections, and toughness of material. The drawback is the limited turning power.

The evidence before Lord Strathnairn's Committee led them to advocate the plan of *locking under*. I can find *no* proof that the necessity arises out of any other conditions than those of our crowded and narrow town thoroughfares.

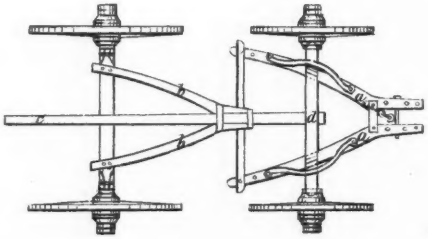
Rigidly constructed carriages only offer an elastic resistance to the draught when springs are added, because there is then less dead pull on the collar. Hence we find both sources of evidence, the Carriage Department and the Carriers, advocating springs, as well as, locking under. These add to the height of the load and to the cost of construction. Many of us have watched the wagons of primitive forms in India, at the Cape, and on the Continent, none of which lock under, and, are quite able to form an opinion if the disadvantages are so great as to make it necessary to sacrifice everything to being able to do so.

I have long made it an object of observation, and I have seen these primitive wagons on the march in war in all the countries named, and can recall very few occasions of difficulty arising out of the limited power of changing the direction of the front wheels, and, I cannot imagine a case in which extrication could not be had, by possession of the means of shifting the draught to the rear of the carriage. This question of *locking under* must be faced, without reference to the wants of our Commissariat wagons used for distributing supplies in garrison towns; and I think the arrangement of under-carriage in the United States' wagon, of which I show a diagram, will help. (See Plate.)

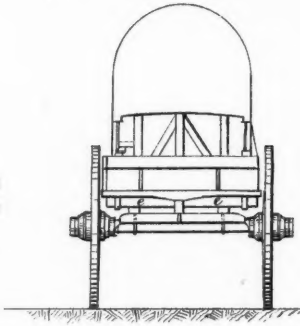
Driving from the seat seems to have gained favour, but like all traditions on the subject derived from what is not the practice of the Artillery, it has been very slow. In 1879 I find Colonel Clifford Parsons repeating here the arguments against it. He says: "It is generally admitted that for transport which must of necessity accompany the troops, be the roads good or bad, the postillion fashion should be maintained, as by it difficulties are surmounted which would be insuperable to wagons driven from the box." The experience of our mule train wagons in South Africa supplies an example which more than refutes this idea. The buck-wagon, of which an illustration is given,[1] was drawn by ten or twelve mules, harnessed two abreast, and driven from

[1] An illustration is also given by Lieutenant-Colonel Furse, that now given is slightly different.

6 MULE, UNITED STA



TOP VIEW OF RUNNING GEAR.
(Brake omitted.)



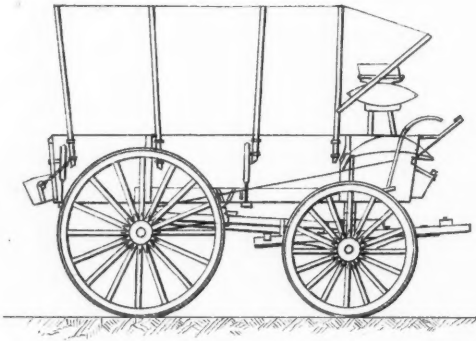
REAR ELEVATION.

References.

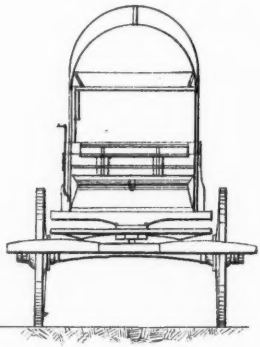
a.a. Front hounds. | c. Coupling-pole.
b.b. Hind do. | d. King-bolt.
e.e. Bolster

SCALE 0 1 2 3 4 5 FEET

2 OR 4 MULE, UNITED STATES ARMY WAGON.



SIDE ELEVATION
(With brake)



FRONT ELEVATION.

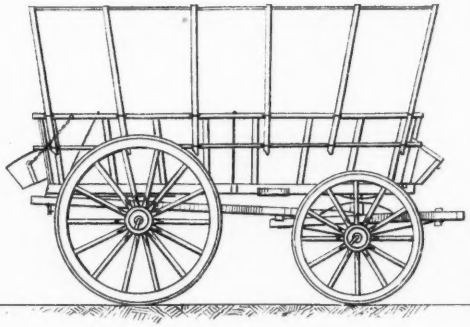
Scale of feet

FT 0 1 2 3 4 5 FT

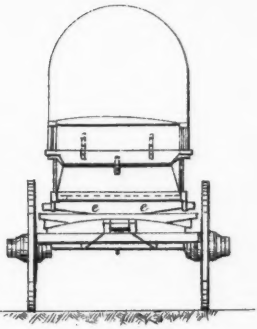
Harrison & Sons Litho. St Ma

TED STATES ARMY WAGON.

ON.



SIDE ELEVATION.
(Brake omitted.)



FRONT ELEVATION.

N.

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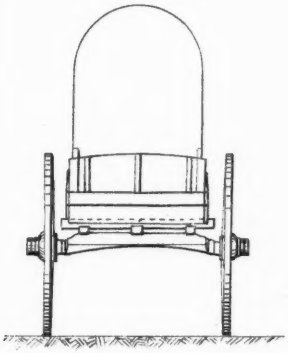
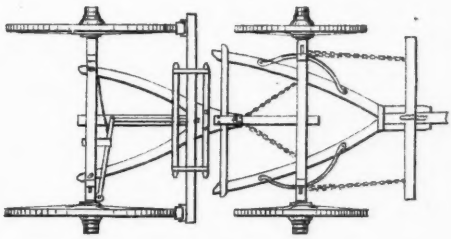
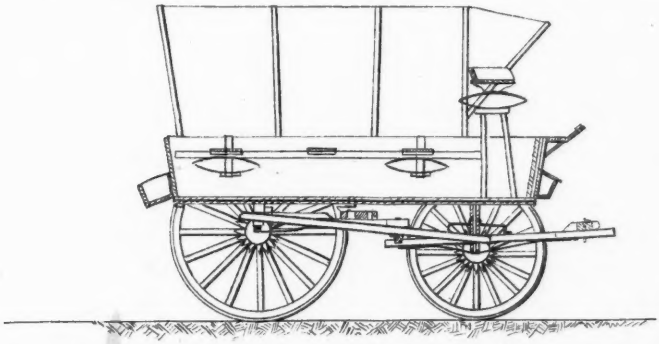


REAR ELEVATION.



TOP VIEW OF RUNNING GEAR.
(With brake)



LONGITUDINAL SECTION THRO' CENTRE.

on & Sons, Lith. 3, Martins Lane W.C.

the seat. The trains passed over the most difficult ground, and through every sort of drift, and rarely came to grief. The two drivers work together, one having the reins, the other the whip; their handiness with the latter being of first importance.

The United States' Army wagon, of which illustrations are given of the size which is drawn by four, and by six, horses or mules, is to my mind the *champion war wagon of the world.* (See Plate and Appendix.)

It is the outcome of long experience in the Far West, and of the troubles about army transport which arose at the beginning of the great War of Secession. The models of wagons and harness are the result of practical experience, and the wheels and principal parts are made with such accuracy as to be interchangeable.

Major-General Rufus Ingalls, Chief Quartermaster, reporting in 1864, writes: "I do not think the kind and amount of transportation for the Army can be improved upon." This refers to the six-mule wagon which carries 1,400 men's *short* rations, and eight days' rations of *short* forage for the mules.

The annual report of the Quartermaster-General of 1865 states as follows:—"The baggage wagon and harness, the general equipment of the trains of our armies, are of models which probably cannot be improved. They have borne the rough usage of war in the hands of men of little experience."

Captain Whitterly, Chief Quartermaster of the 20th Army Corps, writing January, 1865, and describing the march from Atlanta to Savannah between 15th November and 31st December, 1864, a total distance of 281 miles, with 598 army wagons and 105 ambulances, reports: "I cannot suggest any defect in organization, personal or material, of the department; on the contrary, everything seemed to prove the ability, foresight, and skill of the Generals and chiefs of the departments."

There are very many burning questions connected with my subject to which I can do no more than allude.

One, in which I believe Transport Officers take much interest, namely, the regulations under which all transport equipment has to pass in the field through the Ordnance Store Department, causing delays at the very time when every moment is valuable.

Under this legacy from the Control the Transport still groans. Their equipment gets mixed up with all the other army stores. It is taken from the landing-place to the Ordnance Stores, when it ought to go straight to the Transport. It is liable to be temporarily misappropriated, and there is great delay in obtaining an issue owing to the laudable "limpet" nature which the Ordnance develops for the articles in its charge.

Few of those engaged in late wars but have suffered in this way, through the existing peace store arrangements. Time may be of great importance, and yet it may be unavoidably taken up by the demanding department finding out what articles and quantities are really in store, and by the issuing department themselves finding out what they have.

I believe I am quoting the words of an Officer of great experience, in saying that the heads of departments in the War Office would fail to understand the difficulty of getting hold of stores, not from the fault of any individual, but to the peace system, which is not capable of alteration on an emergency.

Late experiences on active service could describe the unavoidable confusion that occurs during the first week after the disembarkation of an Army and its equipment, and the necessity of reducing the number of channels through which equipment has to pass, which is required for immediate use.

If time had allowed, I should have liked much to refer to the use of the Maltese cart, or for lighter work the service pattern garrison cart on general service wheels, which is well adapted for one mule.

The question of the collection, the compilation, and maintenance of a record of the resources of other countries, especially as to mules, has been mentioned: it is one to which a single paper might alone be devoted.

Regulations for the employment of hired or purchased civilian transport in the field, on the lines of communication, require to be framed. I can recall the names of several Officers of the Commissariat, and of other branches attached to the Transport in South Africa, whose experiences would be of great value, and who, if brought together, could draw up an excellent simple guide to Officers and conductors for the future.

Such an experience as that connected with the breaking up, discharge, or re-formation for other purposes, of the great Transport which entered Zululand in May, 1879, would be useful.

I have not referred to a School of Transport. It has often been advocated before. I believe that there are no two opinions on the need for one. It cannot come favourably into existence under the present system. It must be one of the earliest products of the changes I recommend. Any one who has followed the strides which have been made in the means of acquiring knowledge of their profession by Officers of the Army must feel sure that the power to acquire a knowledge of transport duties will be eagerly taken advantage of by numbers. All who have watched the interest taken in the organization of a practical military transport by our leading General Officers, must feel sure that there is no chance of such a Corps being allowed to degenerate into a sham.

If one of the mule train sections employed on the line Pietermaritzburg—Fort Weber (already mentioned) was reconstituted, we should have a sample of one of the most effective transport services this country has ever had, which could be altered and improved on, until every objection was met. One of these sections of 13 wagons required 1 conductor, 1 non-commissioned officer, and 26 drivers, and carried an available weight of nearly 20 tons over very rough roads at an average rate of 20 miles a day, halting at the end of every fourth day, or 80 miles in 5 days.

I submit to the meeting that the chief proposals contained in this paper are moderate. They amount to the complete separation in time

of peace of Supply, and what may be called Army Transport, and the organization of the latter branch on a purely military footing, from which every condition which implies what is called non-combatant shall be expunged; the establishment of a School, not only of *instruction*, but of *examination* in the subject of army transport, connected with the peace cadres: the most rapid transfer to the Reserve of Drivers, of every man who has been trained and served sufficiently long to take his full share in the training of others; the adoption of wagons on the principles of construction followed in the American buck and army wagons; the distinction between, Army Transport in peace and war, and, what may be called, line-of-communication or General Transport; and the establishment of what may be called a Transport Intelligence Officer, whose duty will be, to be able at a day's notice to guide the authorities straight to all the sources of supply of animals, drivers, and wagons, in the world.

If I do not precisely indicate my own view as to who should raise and organize this great General Transport, when the need arises, it is because I feel that the only important decision on the subject which is *now* required, is that referring to the Army Transport, and that, as has always been the case and always will be the case, the best man available for that kind of business, whether, in the Commissariat, or elsewhere, will be selected when the time comes.

The CHAIRMAN: I see present several gentlemen who have taken great interest in the transport question, and I am sure some of them will wish to express their opinions on the propositions made by Colonel Webber, which are almost all contained in the last paragraph but one.

Major-General BRAY, C.B.: I should like to make a few remarks on the lecture we have just heard. The first thing that astonishes me with regard to this lecture is, that in the year 1883—that is, 250 years since the organization of the English standing army—it is necessary for a field Officer to stand up in a public room and lecture on the necessity of having an organized and proper transport for the British army. It is quite right to do so, because we know for a fact that the English army is absolutely without a proper transport. In every war in which it has been engaged the transport has broken down. In every war that is begun, transport has to be initiated; in every war that is finished the transport has to be got rid of; so that at this moment the English army is just as much without a transport as it was 250 years ago. This should not be so, because the English army has greater experience in matters of transport than any army in the world. We move all over the world, and have opportunities of seeing war in every country in the world; we therefore should have more experience and more knowledge, and, what is more, we should be able to apply it, and that is precisely what we do not do. The reasons for all this, in my opinion, are mostly political. It is very difficult for the Government of the day to keep up the necessary nucleus of transport that is absolutely essential in all countries, and until that is done Colonel Webber and his successors may go on lecturing for ever and a day, and you will have no transport. I have seen armies moving in many parts of the world, and I have seen transport of various kinds. In India the transport is wonderfully well managed, because you have the most efficient Commissariat service in the whole world; but you must bear in mind that the transport there is entirely under the control of the Commissariat Officers—in this way, that when war breaks out, they have the power to requisition every carriage and every animal in India, under the authority of the magistrates of India. Now I should like to see the Secretary of State for War in London issue an order to impress all the transport and animals in England for the purposes of war. Why he cannot do it even in peace time: of course for war in England they would have the power to do it, but they have not the power to requisition any-

thing, except on very extraordinary occasions, in this country, and they do not do it. The transport in Afghanistan was very successful. It cost a great deal of money, and it was strictly regimental transport—that is to say, it was divided under two heads: supplies were moved by the Commissariat, and under their directions, and every regiment had its own regimental transport—that is to say, the animals were given over to the Colonel and Quartermaster, and divided amongst the Officers of the companies; they had nothing whatever to do with the transport Officers of the army. The same plan was adopted by Lord Napier, in Abyssinia. There, when he landed, it was the usual confusion all over the place, which cost immense sums of money, and when Lord Napier landed he organized it in the same way as I am speaking of in Afghanistan. The mules were served out to the Colonels of the regiments for the regimental transport, and the transport Officers had nothing to do with it, until the end of the campaign, when they took them over. That transport was most successful, and that is the only successful transport I have ever seen. In Africa, in 1879, in the case Colonel Webber alludes to, immediately after the battle of Isandlwanah, the transport broke down in the most astounding manner. Fresh wagons had to be hired at enormous expense; they could not impress them from the colonists, and they had to pay whatever the owners chose to charge. The sums paid were simply enormous. I recollect one requisition was sent to me, for three wagons for three months, and the Officer paid 80*l.* a month for each wagon to the Boers, the ordinary sum charged in Africa in time of peace being 15*l.* Now, as regards regularly organized transport, you have not far to go to see a nucleus. If you go over to Belgium you will see that army, that never goes to war, organized with a perfect system of transport on a most economical plan. Every regiment has a regimental transport; the infantry have their *fourgons* and horses, the cavalry have their *fourgons* and horses, and the horses that they have, are those which are of no use for riding in their regiments. They are not fit for parade and not fit for riding, but they are capital horses for drawing wagons about the town. The consequence is, you see all over Belgium the military *fourgon* and the military transport, all regimental; they do not belong to the Commissariat, but to the regiment. I asked the Colonels of the regiments about it, and they said it was well done and managed, and cost comparatively next to nothing. There is one way by which I think the Government would arrive at a regular system of transport, and that is by offering some inducement to Officers of experience in the army to come forward and make suggestions; but, in order to do so, there must be some advantage to be gained. Give money rewards for that sort of suggestion, and you will very soon find people come forward and make them. These suggestions should not be lost: they should not only be printed, but the Officers should gain by them. At present, as we know, many energetic Officers send in suggestions to the Horse Guards and the War Office, and you never hear, from that day to the end of time, what has become of them. At the end of the Zulu War, every General, every Colonel, and every Officer holding a high appointment, was called upon to send in a report on everything connected with the campaign. Transport was one important point, and each General and Colonel gave his views upon it. No doubt many of the reports must have been very good, and most interesting, but I have never heard what has been done with them since. In order to have a regular system of transport, you must have a nucleus that must be kept up in every regiment in time of peace. There must be a small number of men,—a very small number would do,—I should think a non-commissioned officer and two men, or a non-commissioned officer and four men, with one Officer who really understands the thing, and can keep it going. A very small thing would do, just enough to work their own supplies about the town—a couple of wagons with four horses, or something of that sort, that could be expanded rapidly in time of war, because you would have people who understood it thoroughly, and it could be done. Then, as regards keeping up the nucleus, the saving of money would be enormous in the end, because of the extravagant waste of money, which is something terrific, when war breaks out. Then the soldiers have it all their own way: they can order what they like. They say, "If you stop us you must be responsible for the failure." The War Department won't be responsible for the failure, and then we get the money. But in time of peace the money cannot be got, and that is the real reason why you never have a transport, and you

never will, until the War Minister is able to make the House of Commons thoroughly understand how necessary a thoroughly good transport is to the efficiency of an army like the British army, and to insist on a regular organized system of transport becoming a part and parcel of the establishment of this army.

Colonel SHERVINGTON: I have listened with great interest to the very comprehensive lecture that we have just had the pleasure of hearing, and I think there are but few present who will not concur generally in the opinion expressed by Colonel Webber. The British army is the only one in Europe which confides the organization, discipline, and administration of its transport to one of its civil departments. Our able lecturer has told us how it is organized in the German army. In that army, I believe, the commissariat and the supply services of every kind are placed under the direction of a General Officer when they take the field. The transport is a separate and distinct service, supervised by an Officer of ability, who is subordinate to the General Officer commanding the lines of communication. Other armies, like those of Italy and Russia, have none but a regimental transport, which in a measure has a decided advantage over a more general one, in that it looks after the individual requirements of the regiment to which they belong, and is therefore always at the advanced posts of the army. We are aware, as Colonel Bray has said, that the Indian Commissariat is second to none; they hitherto have had charge of the transport service. I am not quite sure, however, that it is generally known that it has been suggested, of late, to make an alteration even in the Indian Commissariat, with regard to transport, and to withdraw it from their direct management and control. The extraordinary difficulties, the enormous responsibilities, and the multiplicity of the duties which devolve upon the Commissariat in war, render it absolutely necessary that they should confine the whole of their attention to the collection of those supplies which the transport should convey along extensive lines of communication to the immediate presence of the troops. Reference was made to London, and to the impossibility of requisitioning its transport, and the animals which it contains. Notwithstanding the large supplies that reach London, few of those who provide the supplies have anything to do with their conveyance to those who require them. We have amongst ourselves in London one of those large depôts which is well known to all of us, supervised as it is by intelligent administration, watchfulness, and care. I refer to the Army and Navy Supply Stores, where they find you almost everything which you can desire. Yet I have never heard it was proposed to provide their own transport to convey supplies to their distant customers about London. I doubt indeed if they would succeed, either practically or financially, if they did so. They are quite satisfied to summon the aid of Messrs. Carter and Paterson, who conduct the supplies, without either difficulty or trouble, to the most distant parts. The lecturer spoke about the wagons, and I think that question is a very important one. The wagon before us just now has much in common with one built in North America by Colonel Clarke-Kennedy and myself. We brought a pattern home to the Royal Arsenal of Woolwich. It had a chain to prevent complete lock under, which I think is almost a disadvantage in army transport. There is no necessity for it, because any difficulty arising from getting round a corner may be easily avoided by taking proper distance and moving quietly. The lecturer spoke in favour of driving from the box. I think, except on good roads, this is a pernicious system; the driver is more likely to drop asleep, and, with one hand holding the reins, the other the whip, he is liable, when traversing uneven and broken ground, to be jerked off. Several drivers have met with serious accidents at Aldershot in consequence. I think, therefore, that the saddle, where a driver is more likely to be kept awake, and would be more careful where he puts his horses' feet, is the best place for transport drivers. I am persuaded all transport must be military, under a specially selected military Officer, and that a General Officer, as chief of the civil staff of the army, should take the supervision and direction of all the supply services in time of war. I often hear the Officers of the Commissariat say that they cannot be held responsible for the supply of provisions unless they have the transport under their command. Now I am one of those old soldiers who think there is only one man responsible in the field, and that is the Commander-in-Chief. The Officers of the Commissariat are, no doubt, answerable to him for the collection and provision of the supplies; but the Commander-in-Chief alone is responsible that they are duly issued to the troops.

Colonel EAST, Assistant Quartermaster-General, Intelligence Branch: I wish to offer one remark, with reference to the suggestion made by the lecturer, that the Commissariat should establish an intelligence department for the collection of information regarding transport animals and wagons available in foreign countries. It is only right to mention that in the War Office this information exists in every detail for every country, not only in Europe but in all other parts of the world, from which transport animals and wagons could be conveniently obtained. This information was at the disposal of the Director of Transport and Supplies and of the Commissary-General during the recent preparations for war in Egypt.

Major-General LAURIE: I do not wish to go into the question of the organization of transport, but I feel I may offer a few remarks on the subject of the suitability of the vehicles that have been referred to by Colonel Webber. I have lately returned from British Columbia, and I was rather struck with the means of driving that are there adopted. With four or six horses I noticed that one man drives and sits on one of the wheel horses, and they maintain that that is the best method of driving over rough roads, and the handiest that can be adopted. I mention that as an alternative suggestion to having a postillion on every pair of horses, or a driver sitting on the box. The principal wagon road in British Columbia skirts the Fraser River with precipitous banks, sometimes with a sheer fall from the road to the river surface of 1,200 to 1,500 feet, and here, if anywhere, good and careful driving is wanted; the road is narrow and rough. Slides from the cliff above, and gullies in the road-surface, require constant attention and skilful handling of team; yet this is the plan adopted, whether by Americans from the Western States, Canadians from the Eastern Provinces, or men coming fresh from the old country, so there must be good reasons for the plan. Of course two or more teams generally travel in company to lend a hand in difficulties, or double teams in a bad place. I can speak with some experience of the wagons such as Colonel Webber has put before you: for in amusing myself in clearing up a rough bush farm in Nova Scotia, I have been in the habit of working wagons such as those referred to. I have had them in every possible place that a wagon could be put into, and I have hardly ever succeeded in breaking them. They are wonderfully strong and wonderfully handy; we get them into a bad place, and we can get them out again. With a handy team, and sometimes a very awkward driver, we can save these wagons, when a wagon of other construction would be almost certain to go. With a judicious handling of the double tree, you can take your horses out of the front and attach them to the rear of the wagon, so that if you cannot pull your wagon forward you can pull back. I have constantly seen my teamsters take the team to the back of the load and haul the wagon out backwards instead of forward. Our idea of vehicles is that we should give them as little rigidity as possible, all the play we can, and they last many times as long as they would if made rigid. The more play the better; it will carry a load all the better, and will work the better over very rough land. It is the same with our sleds, for use in the snow in winter, in hauling timber and very heavy material: they have so much play, they look as if they would crush down under a load, but they stand very much the better for this, especially from the side jerks that they meet with on rough land, and which would strain them and destroy them if they were built rigid. I may mention, as another great advantage of these wagons, that the body is, so to speak, a separate part, and when it is disabled the carriage part is as strong and serviceable as ever for moving timber, lumber, and any other lengthy and solid substance; we often remove the body, putting a light bolster on the front axle, and let the load ride directly on that and the hind axle. They run very easily and carry a great weight, according to their appearance. I have moved a steam-engine boiler, 22 feet long, and weighing 4,700 lbs., over 18 miles in an afternoon with three horses, on a rough and hilly road. The wagon had 2¼ inch axles, and had been in use amongst stumps and stones, in the roughest part of my farm for over ten years. By changing the pole to an ox-tongue it is readily fitted for oxen.

Assistant Commissary-General E. HUGHES, C.M.G.: I should like to say a few words about Colonel Webber's lecture. It would almost require another lecture to go fully into all the points of which he has spoken with regard to the Commissariat transport; and therefore it will be impossible for me, in the short time that I can

now speak, to go really into everything that he has said. I may say, however, that every Commissariat Officer from experience would enunciate most strongly the principle that Colonel Webber also agrees in, namely, as to the necessity of keeping the supply and transport together. He would put them into the hands of the General Officer in charge of the line of communications, and that is a principle which is not at all antagonistic, I think, to the feeling or wishes of any Commissariat Officer. The object of all of us is to get at what is the right thing to do, and our endeavour has been for many years past to go step by step towards many of the points which Colonel Webber has himself urged, and which are very necessary. We are certainly in favour of bringing our duties thoroughly into the hands of the General Officer, putting them under his control as completely as possible, and removing them from what we might call the civil control: we wish to change it from being a civil department into as military a corps as possible. The great difficulty has been, as General Bray remarks, that when any extensive proposition has been put forward by Commissariat Officers, the question of money has always stood in the way. We wished to have an increased corps: we ourselves wished that the regiments should be equipped with transport, but the difficulty has always been the want of money. One point which we have striven for for a very long time has been obtained, and recently: that is, that we should be removed from the department in the War Office, who look so very much after the money, and go to the Horse Guards, who look to efficiency as the first thing, and money as a secondary matter. That alteration has recently obtained, and we trust by this means for the future to be able to strive towards efficiency more than simply for economy. As to the different points of organization which have been mentioned, I agree that the regiment should have its transport, should have it always with it, and should not be separated from it. The only point on which I should disagree with Colonel Webber is, that he would take it so far away from the Commissariat that he would not have any one of the Commissariat staff or corps in any way connected with the regimental train. Now my own experience has been, that when the transport has been manned out of the regiment, it has not been the best men who have been detailed to undertake the duties, and certainly not the best Officers. The duties the regimental transport Officer would have to do would very often lead him to a position away from the place where he would be able to acquire distinction, and so it results that, when the British Government wish in time of war to organize regimental transport, it is not the best Officer who is willing to undertake that duty. It might often be (as really was the case at Tel-el-Kebir) that, in the time of great actions, the regimental transport Officer would necessarily be rather left behind. In order to have a regimental transport, the right plan would no doubt be to have certain Officers and men detailed for each regiment, and I would take them from the Commissariat; they should always be kept with the regiment, and it should be the rarest exception in the world that they should have to leave it. The point of being under the command of the General of Communications is another one that the Commissariat have always striven for, namely, that the General should feel himself as responsible for their part of the duty as he does for the duties of any of his staff Officers. The difficulty has always been to get a General Officer to realize this, and therefore to admit the responsibility; if they would, it would be also exactly what is wished for by the lecturer. There are many other things which Colonel Webber has taken up that one would like to mention, but it is impossible to go into all without, as I say, another lecture. I should, however, be sorry that this meeting should separate without its being thoroughly understood that there is another side of the question, and that the Commissariat Officers are as anxious for progress, in the direction that every one here seems to desire, as any person can possibly be.

Colonel Sir LUMLEY GRAHAM, Bart.: It appears to me that all who speak and write upon this subject are quite agreed with regard to one question, and that is as to the necessity of having regimental transport in the first line. Though there may be some difference of opinion as to details, every one is of opinion that there should be a special regimental transport told off for carrying the immediate supplies for the troops, besides the rations which they always should carry on their persons for use in time of emergency. Here the question of cost comes in; they say you

cannot keep up the nucleus of this transport in peace time, because you cannot afford the money for it. But now it has been settled that we should at least keep one Army Corps always ready for immediate service—almost on a war footing, so as to be able to embark at any moment, it seems to me a farce to keep the corps ready for service, without the means of moving it, so that I should think it would be a very good expenditure of money, if we do not choose to supply all our regiments with a nucleus of transports, at least to supply the regiments that are first for service with it. It would not be a very large expense. Again, as we may be called upon to carry on war in any part of the world, would it not be advisable that a nucleus of the transport particularly applicable to the special country should be kept up in each of our colonies, such as the Cape of Good Hope for instance, where wars constantly crop up? That would be a great assistance, and, I believe, in the long run a very great economy. You would have stopped that enormous rush after buying and hiring things which has been so graphically described by General Bray. By the bye, referring to what General Bray said, may I be allowed to make one remark? He spoke with great praise of the way in which the transport service is conducted in India, and there is reason to believe that, comparatively speaking, it is good. I can, however, hardly think that it deserves the extraordinary praise that he gave it, seeing that whenever there is a great Indian war we find, if there is not a breakdown, that breakdown is only prevented by a fearful expenditure of animals and money. In the first expedition to Afghanistan, before Sir John Keane's column got even to Candahar, they had expended something like 25,000 camels, and I believe in the last Afghan War, the expenditure of camels amounted to something like 50,000—not to mention other animals. That, we are led to suppose, was owing to the incomplete arrangements,—that the people who had charge of those animals did not know how to take care of them—and that in a great measure they were lost, owing to the incomplete peace arrangements, as the people in charge[1] had not been properly trained in peace time for the care of the transport in war. I only speak by hearsay with regard to these matters; but I should like, if possible, to have further information on the subject.

General BRAY: In the Afghan War there were nothing but camels used, because there were no carts in the country. The carts from India would not travel over that country: they would have been smashed to pieces. There are no roads at all: they are all boulders. The camels all belong to the owners, and the owners are with the camels the whole time and actually take care of them. There were Officers to look after the transport, but no soldiers to look after the camels in the Afghan War—the owners looked after them; general supply being managed by the Commissariat, the regimental carriage by the regimental commanders.

Sir LUMLEY GRAHAM: I was alluding to the Officers in charge of the transport department.

General BRAY: Which? The supply or the regimental?

Sir LUMLEY GRAHAM: I am referring to the whole transport.

General BRAY: The transport supply of the first Afghan War was under a Commissariat Officer, but the regimental transport was under a regimental commander: that was the distinction; but the camels were actually tended, fed, and groomed by their owners.

Sir LUMLEY GRAHAM: Were they not divided into sections?

General BRAY: Not in the first Afghan War.

Sir LUMLEY GRAHAM: They were in the second?

General BRAY: No; not in the first Afghan Wars, from 1839 to 1842.

Major GRIMSTON: I think the real reason why we break down in our transport in war is because in peace everything is done by contract: all our food and every part of our supply is brought to the man's mouth almost, by contract. You cannot get those contracts abroad, and therefore when you go to foreign

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[1] By the "people in charge" I mean the Officers and non-commissioned officers detached from regiments to make up for the want of regular transport Officers, who, though as a rule zealous and hardworking men, were, in many cases, unacquainted with the habits of the animals, biped and quadruped, under their charge.—L. G.

countries you are unable to get your work done, and you have no transport. You do not want the transport in England, where everything is brought to you, and you have nothing to carry. If the Commissariat would take the trouble (they won't thank me for saying so) to do at home what they have to do abroad—that is, to bring all the supplies to the regiment, and do the contractor's business, then we should find plenty of nucleus for our regimental system of transport, and we should then get on very well; everybody would be accustomed to do as they would have to do abroad. The real fault, as I say, is that we have large contracts for bringing everything, because by that means it is easily done, and we save trouble. With regard to the American wagon which Colonel Webber has shown us, it is a very beautiful thing, but it strikes me that the body is rather too narrow: I do not see any object in its being so narrow, further than this—the wheels will not lock if broader; but if there was a slope in the side, instead of its being perpendicular, the wheels would have just as much play, and the wagon would contain a great deal more than it does at present.

Colonel WEBBER: Mr. Chairman, I think you will agree with me that, as no very important objections have been made by the speakers to the points which I have had the honour to-day to submit to the meeting, it would be taking up your time fruitlessly if I were to attempt to say much in reply. I have been glad to find that the meeting seems to acknowledge the clearness of my propositions, for no remark has been made asking me to elucidate any of them. I think they are mostly (as you, Sir, have said) contained in the last sentence but one, and I would ask any gentleman interested in this subject to glance over that paragraph, and perhaps when they get their number of the *Journal* they may be interested in looking through the papers, and then I think they will find almost every observation that has been made by those who have been kind enough to speak to-day has been partly if not entirely answered. The subject was so large that it was quite out of the question for me to attempt to refer to the great work that has been done by the Transport Department in India of which General Bray has kindly reminded us. Colonel Shervington's observation on the subject of *Postillion Riding* is answered in the paper, and I think it will be accepted by any one who has seen the way in which, not Africanders, but Army Service Corps men, move those teams of mules in South Africa to which I have referred. I had twenty-two of those sections, each composed of thirteen wagons, passing frequently under my supervision, and there were as many Englishmen who had learnt to use the whips as there were Africanders. If you had seen that you would never have thought of putting an extra weight either on your wheeler or your leader, whether for the purpose of keeping the man awake or saving his bones in the event of an upset. I was greatly pleased with the testimony that has been given to the efficiency of this beautiful American wagon. I think that if two or three such wagons were brought over to this country and used over rough ground and driven with full loads, as they are done in America, my admiration of them, and the title I have pretended to give them, namely, of being the champion army wagon in the world, would be fully borne out. I may say that this wagon weighs in itself only about 1,600 lbs., and it will carry a full load of 20 cwt. With reference to what Sir Lumley Graham has said as to the advantage of maintaining, in addition to a nucleus of a regimental transport in this country, samples of transport used in other countries, I would like to say one word, which is, that if we had maintained in England, before the South African War, a South African ox-wagon, and used it here and got experience of it, I do not believe we should have acted differently. After hundreds of those ox-wagons had been in use, the authorities sent to America for wagons and mules, for what proved to be our most efficient train. It does not, therefore, follow that the wagon which we may adopt in the future for general service may not be as suitable a wagon for any country as that indigenous to it.

The CHAIRMAN: Gentlemen, so many Officers have spoken, and the time is so short, that I shall confine myself to offering a very few remarks before asking you to return your thanks to the lecturer. The difficulties connected with English transport are far beyond those of any other country. Never does one war follow another in which the same transport is required, and the idea of keeping up a nucleus of transport in each country, as suggested by Sir Lumley Graham, is totally imprac-

ticable. For instance, could a nucleus of bearers on the coast of Africa, or a large transport force of mules in Abyssinia, be maintained? There is no necessity for this nucleus in South Africa, as the wagons can be horsed, or you can have the buck wagons, which, as Colonel Webber said, the men are soon taught to use. We cannot afford even to keep up a nucleus in England; much less could we afford to keep up a nucleus abroad. The question appears to me to be how we can best utilize the small funds which are at our disposal for transport. Some think, and I quite agree, that it is quite necessary to maintain a nucleus of regimental transport in time of peace. Other nations—Russia, Germany, and Austria, Italy, Belgium, and France, all have a regimental transport, and why are we, who pride ourselves on our regimental system, to differ from other nations? Why is it necessary that we should have a detachment furnished by the Commissariat attached to a regiment? For my part I think it would be very much cheaper to train a few men in each regiment for transport duties under an Officer of the corps. My experience has been totally different from that of the gentleman of the Commissariat Department who spoke to-day. I have always seen the very best Officers volunteer for the regimental transport; I have known very indifferent Officers volunteer to go to the Commissariat; but if they were with their own regiment, the Colonel would take very good care that, where so much depended on the Officer, he would not allow even indifferent Officers to be employed for transport duties. The argument of self-interest goes completely against what the gentleman I referred to, has said. Colonel Shervington spoke about Carter and Paterson and the transport of the army. I believe they are excellent organizers, and I believe we could not get better men to put at the head of transport duties, but as we have not got Carter and Patersons in every country it would be totally impossible to rely upon them in order to deliver our stores to the Commissariat; and the Commissariat must have an efficient transport, as they are responsible for feeding the army, but whether the regimental transport should be under that department is a matter of opinion. I beg to return our sincere thanks to Colonel Webber. His lecture has been most instructive: it is a lecture which shows that he has gone thoroughly into the subject from beginning to end; and the question as to which plan we are to adopt, whether the transport is to be under the Commissariat or in charge of a military train or regiment, depends upon which plan can be carried out in the most convenient manner. We must adopt the cheapest plan, for we have not got money to try experiments in different kinds of transport. I have been in America for many years, I have travelled over all sorts of roads in those wagons which Colonel Webber and General Laurie have mentioned, and my experience is that they never break down: they are the best wagons in the world for rough roads. A Committee sat in London some years ago to select the best wagons for military purposes, and whom do you think were asked to give an opinion upon the subject? Why the carriers of London, who never go off the smooth roads, and their opinion was in favour of high spring wagons certainly, which were the best for their purposes but the worst for army purposes. I beg to return our sincere thanks to Colonel Webber.

A FEW NOTES

ON THE

PURCHASE OF MULES AND HORSES IN 1867 IN TURKEY.

ALTHOUGH the conditions have been probably affected by the waste which occurred on account of the Russo-Turkish War, the general circumstances are not materially changed since 1867.

Approximate secrecy of the intentions of the British Government to make Turkey the scene of purchase operations is important. In 1867 this intention

became generally known (*abruitée*), through Her Majesty's Consuls, who had received instructions from the Foreign Office to spread the news. The effect was at once to raise the price all over the country, and time was lost in waiting for the effect to subside.

Negotiations at Constantinople should be avoided; they will only be with bankers and agents, who will employ other middle-men.

Animals can be procured at the provincial towns, by either contract or agency.

If time is an essential condition, contract is the best means, if solvent contractors can be found who are willing to be bound under a heavy penalty. The men who become contractors should be known to be inland merchants who are acquainted with the interior of the country. They will sublet to their own local commercial agents.

The disadvantages of contracts, are, that the prices are high, the *best* animals are not procured, while sometimes others which, if cheap, would answer certain purposes, are rejected, as not being worth the contract price.

If direct agency is employed, the purchase of animals may commence *at once* in a large number of small centres, and the agents need not be under any penalty. A specification of the kind of mules required can be sent to each and a day named for the visit of the inspecting Officers. The English and foreign Consuls would frequently undertake to collect animals on the prospect of their being passed, owners would take the risk, and the inspecting Officers might often pass animals not *quite* up to the mark at reduced prices.

In such a case the inspecting Officers should have an interpreter. A slight knowledge of Turkish or Greek, so as to check the interpreter, would be of great use.

By contract, one thousand mules should be obtainable, of the quality described, delivered on board ship at any port in the Levant, for 23*l.* a head.

The contract should not be completed without the contractor first placing a sum of money to the credit of Her Majesty's Secretary of State for War in the nearest bank, amounting to about 1*l.* per mule, as, first, a proof of his real intentions and ability to carry out the contract, and, second, to cover any penalties that may be exacted. This was required from, and complied with by large contractors at Smyrna in 1867, and proved a most salutary measure.

The contractor should take all responsibility up to the ship's side. The contract should specify, besides the age and height of the animal, "*the average of the first quality of pack mules procurable in the province of*," &c. Also, that, with each animal, should be delivered—

1 new head-stall and rope.
1 nose-bag of camel's or other hair, weighing not less than 11 ozs.
1 back-pad of felt and hair, with surcingle.
1 kicking-rope.
1 set of spare shoes and nails.

The contract should allow that the mules may be branded or marked at any place which suits the convenience of the inspecting Officers, but, that such branding or marking shall not imply delivery.

If purchase by contract, as described above, is followed, one Officer, provided with a printed form of the terms in English, Turkish, and Italian, should leave England at once and proceed to the East, and complete the contract, and, having arranged for the dates and places of delivery, telegraph home for parties of inspecting Officers to follow. Each inspecting party should be composed of two Officers, one being a Veterinary Surgeon. Each party should be provided with branding-irons, one for the flank and one for the hoof; also, with two sizes of pack-saddles, so that each mule, when being examined, may be easily tried with a load on his back.

If the system by agency is adopted, inspecting parties, as described above, should proceed to any one or all of the places mentioned below, provided

with cash in gold, so that every animal can be paid for when passed. Before commencing operations each party should engage an interpreter, at 3*l*. a week, and a head muleteer, at 1*l*. a week.

In Turkey in Europe—

Lagos.
Carvalho or Serez (near Salonica).
Widdin, on the Danube.
Janina, in Albania.

In Asia Minor—

Trebizonde.
Ineboly, west of Sinope.
Broussa.
Aidin.
Islands of Mytelini and Chios.
Adalia.
Tersus.
Larnaka, in Cyprus.

Another Officer should proceed to Constantinople, to arrange for the supply of cash to the various parties and of transport from the ports of embarkation.

By employing the khanjees, syces, and farriers, to be met with in the bazaars, and sending them into the district to collect mules on certain days at convenient points for inspection, about 300 to 500 mules could be procured in a fortnight at each of the points named at an average cost of 15*l*. Their keep after delivery will come to about 1*s*. 3*d*. a day, and their share of the wages of muleteers about 6*d*. a day per mule.

At Trebizonde mules are not bred, but plenty of good ones arrive daily with loads from Erzeroum. Once, the carrying trade employed upwards of 16,000 pack animals. On the routes from Trebizonde to the interior they could be bought for 12*l*. to 15*l*.

An agency at Ineboly should employ persons engaged in the wool trade, who would buy at Kjankany, Tusia, Amasia, and Kastamuni.

In Broussa about 150 mules can be bought, and a large number is obtainable at Kjutahia.

At Mytelini about 300 good mules are obtainable for about 16*l*., and about the same number on Chios, and about 50 from the mainland opposite.

Aidin is a good centre from which to purchase in all the south-west of Asia Minor, and the prices range about 15*l*. for mature pack mules.

In 1867 the price of mules in Cyprus was 18*l*. to 20*l*.

Adalia is a good point for collection and shipment.

Adana should be the point of collection from the district north and north-east to Diarbekir.

No Asia Minor mules should be under thirteen hands, nor outside from five to twelve years of age.

There may be said to be three qualities—

1st. The riding mule of upwards of fourteen hands, and costing 20*l*. to 30*l*., which is more or less scarce.

2nd. The caravan or wood-cutter's mule, bred in the interior, about thirteen hands in height; a strong bony animal, and the kind to be sought for, for military pack purposes.

3rd. The cultivator's mule, which has more of the jennet about him, has probably been rejected by the muleteer, and remains on the hands of the producer who uses him for farm purposes. This last class is of the kind which contractors and agents will first show the purchasing Officers, which they can buy for 8*l*. or 9*l*., and for which they will ask 15*l*. It should be avoided.

The Roumelian mules are generally of less value, and smaller than those of Asia Minor, and less suitable for the tropics.

At the great Adrianople fair, one of which is held between the 11th and 16th October, a large number of horses and mules can be bought; the prices of the latter range as follows :—

3 to 4 years	12*l.* to 13*l.*
5 to 6 „	14*l.* to 15*l.*
7 to 9 „	16*l.* to 17*l.*

At Widdin and Janina, each, about 1,000 mules could be collected for the above prices.

In 1867, 900 mules were collected by contract at Smyrna for 22*l.* 10*s.*, including delivery at the ship side.[1]

They were fair average quality, hard, but in lean condition. Each before being passed was tried with a load of 400 lbs. About 20 per cent. of those offered by the contractor were rejected.

The purchase of mules in the neighbourhood of Salonica should be conducted from Port Lagos and Carvalho. Kemouldjina (? Ghinmurgina), about four hours' ride from Lagos, is the best centre, and there an agency should be established without delay. There, 1,000 to 1,500 could be collected for 12*l.* to 15*l.* In this district purchase should be conducted by agency, not contract; local people could be found who would bring in 80 or 90 mules. The very best mules for exportation to Greece here fetch as much as 22*l.*

Pack horses in large numbers can be purchased in Western Asia Minor. On market day in a town as large as Aidin 50 or 60 were procured in one day, of these 15 were fit for riding purposes; the average price was 10*l.* 7*s.*

A party of inspecting Officers on arrival in a town should seek a commission agent, and engage to pay him a commission on each animal bought on an inverse sliding scale, the commission increasing as the price diminishes. The payment in every case should be made in gold to the owner. The news of this manner of dealing spreads rapidly over the country. At first all the bad animals around will be offered at exorbitant prices; a few days' patience will bring all to its normal level, and owners will be only too glad to sell for ready money for the really good prices I have quoted.

The great thing is for the purchasing Officer to visit one or two remote places quietly, and ostensibly for some other purpose. There, having made up his mind what he will give, stick to the price.

Great expense is gone to in fitting up vessels for the transport of mules, and it is no doubt necessary for long ocean voyages; but when the distances are not great, and in summer weather, large cargoes of mules and small horses may be transported from port to port in the Mediterranean with very little fitting by spreading on the main and upper decks a layer of coals.

Mules of the size bought in the Turkish dominions can be penned with spars or boat-oars lashed to uprights, nailed to the deck, five to eight in each pen. It is of advantage to the animals to stand as close together as possible. By placing each animal a little in front or in rear of his neighbour, 18 inche is enough for each. The breast pole should be exactly 4 feet 8 inches from the back, and 2 feet 9 inches above the floor.

C. E. W.

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[1] All these mules were inspected by Veterinary-Surgeon Anderson, R.H.A.

APPENDIX.

The United States Army Wagon and Mule Harness.

The following specifications for wagons and mule harness are taken *in extenso* from those published under the authority of Major-General R. Ingalls, Quartermaster-General U.S.A., Washington, 1882. They are so complete and detailed that any manufacturer could work from them.[1]

Wagon.

Specification of Six-Mule U.S. Army Wagon (Covered).

See Drawings Nos. 1 and 2.

The *front wheels* (12 spokes, to have a 3-inch tenon) to be 3 feet 10 inches high, hubs 10 inches in diameter in centre, 8¼ inches in front of hubs, and 14½ inches long. *Hind wheels* (14 spokes, to have a 3-inch tenon) 4 feet 10 inches high; hubs 10¼ inches in diameter and 14½ inches long; felloes 2½ inches wide and 2¾ inches deep; cast-iron pipe boxes 12 inches long, 2½ inches at large end and 1⅞ inch at small end; tire 2½ inches wide by ⅝ inch thick, fastened with one screw-bolt and nut in each felloe; hubs made of gum, locust, or the best white oak, well seasoned; the spokes and felloes of the best white oak, free from defects; each wheel to have a sand band and linch-pin band 2¾ inches wide of No. 8 band-iron, and two driving bands—outside band 1¼ inch by ¼ inch thick, inside band 1 inch by $\frac{3}{16}$ inch thick; the hind wheels to be made and boxed so that they will measure from the inside of the tire to the large end of the box 6½ inches, and front wheels 6⅛ inches in a parallel line, and each axle to be 3 feet 11⅜ inches from the outside of one shoulder-washer to the outside of the other, so as to have the wagons all to track 5 feet from centre to centre of the wheels. Axle-trees to be made of the best quality refined American iron, 2½ inches square at the shoulder, tapering down to 1¼ inch in the middle, with a ⅞-inch king-bolt hole in each axle-tree; washers and linch-pins for each axle-tree—size of linch-pins, 1 inch wide, ⅜ inch thick, with a hole in each end; a wooden stock 4¾ inches wide and 4 inches deep, fastened substantially to the axle-tree with clips on the ends, and with two bolts 6 inches from the middle, and fastened to the hounds and bolster (the bolster to be 4 feet 5 inches long, 5 inches wide, and 3½ inches deep) with four ½-inch bolts.

The *tongue* (or pole) to be 10 feet 8 inches long, 4 inches wide, and 3 inches thick at front end of the hounds, and 2½ inches wide by 2¾ inches deep at the front end, and so arranged as to lift up; the front end of it to hang within 2 feet of the ground when the wagon is standing at rest on a level surface; the tongue-cap to be ⅝-inch round iron, welded into iron 2 inches by ¼, 15 inches long, bolted with three bolts $\frac{5}{16}$ inch diameter.

The *front hounds* to be 6 feet 2 inches long, 3 inches thick, and 4 inches wide over axle-tree, and to retain that width to the back end of the tongue; jaws of the hounds 1 foot 8 inches long and 3 inches square at the front end, with a plate of iron 2½ inches wide by ⅜ inch thick, fastened on the top of the hounds, over the back end of the tongue, with a ½-inch screw-bolt in each end, and a plate of iron of the same size turned up at each end 1½ inch, to clamp the front hounds together, and fastened on the under side and at front end of hounds with a ½-inch screw-bolt through each hound, and a ⅝-inch bolt through tongue and hounds in the centre of jaws to secure the tongue in the hounds; a plate of iron 3 inches wide, ¼ inch

[1] The publication of the details will prevent the originality of the patterns being appropriated by any Department or manufactory in this country: a kind of piracy of which we are too often guilty, and rather fond of accusing our neighbours.—C. E. W.

thick, and 1 foot 8 inches long, secured on the inside of jaws of hounds with two bolts $\frac{3}{4}$ inch, and a plate of same dimensions on each side of the tongue, where the tongue and hounds rub together, secured with two rivets; a brace of $\frac{7}{8}$ inch round iron to extend from under the front axle-tree and take two bolts in front part of the hounds, same brace $\frac{3}{4}$ inch round to continue to the back part of the hounds and to be fastened with two bolts, one near the back end of the hounds and one through the slider and hounds, and within 2 inches of slider on wagons finished; a brace over front bolster $1\frac{1}{2}$ inch wide, $\frac{1}{4}$ inch thick, with a bolt in each end to fasten it to the hounds; the opening between the jaws of the hounds to receive the tongue $4\frac{3}{4}$ inches in front and $4\frac{1}{2}$ inches at the back part of the jaws.

The *hind hounds* 4 feet 8 inches long, $2\frac{3}{4}$ inches thick, and 3 inches wide; jaws 1 foot long where they clasp the coupling-pole; the bolster 4 feet 5 inches long and 5 inches wide by $3\frac{1}{2}$ inches deep, with steadying iron $2\frac{1}{2}$ inches wide by $\frac{3}{8}$ thick, turned up $2\frac{1}{2}$ inches, and fastened on each end with three bolts $\frac{3}{4}$ inch; the bolster stocks and hounds to be secured with four $\frac{1}{2}$-inch screw-bolts, and one $\frac{1}{2}$-inch screw-bolt through the coupling-pole; a substantial stay under each back hound and axle to form a clasp under each, and bolted to hound 18 inches forward of axle, and two rivets through each end of coupling-pole.

The *coupling-pole* 9 feet 8 inches long, 3 inches deep, $4\frac{1}{2}$ inches wide at front end (which will be strapped with $\frac{5}{32}$ by $1\frac{3}{4}$-inch iron, extending back $9\frac{1}{2}$ inches) and $2\frac{3}{4}$ inches wide at the back end; distance from the centre of king-bolt hole to the centre of the back axle-tree 6 feet 1 inch, and from the centre of king-bolt hole to the centre of the mortise in the hind end of the pole 8 feet 9 inches; king-bolt $1\frac{1}{4}$ inch diameter, of best refined iron, drawn down to $\frac{7}{8}$ inch where it passes through the iron axle-tree; iron plate 6 inches long, 3 inches wide, and $\frac{1}{8}$ inch thick on the double-tree and tongue where they rub together; iron plates $1\frac{1}{2}$ by $\frac{1}{4}$ inch on the sliding-bar, fastened at each end by a screw-bolt through the hounds; two bolts to pass in sliding-bar within 3 inches of hound. Front bolster to have plates above and below 11 inches long, $3\frac{1}{2}$ inches wide, and $\frac{3}{8}$ inch thick, corners drawn out and turned down on the sides of the bolster, with a nail in each corner and four countersunk nails through plate, and sandboard and plate underneath; two bands on the hind hounds 2 and $2\frac{1}{2}$ inches wide, of No. 10 band-iron; the rub-plate on the coupling-pole to be 8 inches long, $1\frac{3}{4}$ inch wide, and $\frac{1}{4}$ of an inch thick.

Tongue, hounds, coupling-pole, axle-beds, and bolsters to be of best quality white oak, well-seasoned; double-tree 3 feet 10 inches long, single-tree 2 feet 8 inches long, all well made of hickory, with an iron ring and clip at each end; the centre clip to be well secured; lead-bar and stretcher to be 3 feet 2 inches long, $2\frac{1}{4}$ inches wide, and $1\frac{1}{4}$ inch thick; lead-bars, stretchers, and single-trees for six-mule team to be of the best quality of hickory; the two single-trees for the lead mules to have hooks in the middle to hook at the end of the fifth chain; the wheel and middle pairs with open rings to attach them to the double-tree and lead-bar; the fifth chain to be 10 feet long to the fork; the fork 1 foot 10 inches long, with the stretcher attached to spread the forks apart; the links of the double-tree, stay and tongue-chains $\frac{3}{8}$ of an inch diameter; the forked chain $\frac{7}{16}$ inch diameter; the fifth chain to be $\frac{7}{16}$ inch diameter to the fork; the fork to be $\frac{5}{16}$ inch in diameter; the links of these and the lock-chains to be not more than $2\frac{1}{4}$ inches long; a cross chain $\frac{7}{16}$ inch diameter, with key and ring, will be required to cross the bed.

The *body* to be straight, 3 feet 6 inches wide, 2 feet deep, 10 feet long at the bottom, and 10 feet 6 inches at the top, sloping equally at each end, all in the clear or inside; the bed-pieces to be $2\frac{1}{2}$ inches wide and 3 inches deep; front pieces $2\frac{3}{8}$ inches deep by $2\frac{1}{2}$ inches wide; front and cross-pieces to have $\frac{1}{4}$-inch rivet in each end, 1 inch from side rail; tail-piece $2\frac{1}{2}$ inches wide and 3 inches deep, and $4\frac{1}{2}$ inches deep in the middle, to rest on the coupling-pole; top rail $1\frac{3}{8}$ inch thick by $1\frac{7}{8}$ inch wide; lower rails $1\frac{1}{8}$ inch thick by $1\frac{7}{8}$ inch wide; three studs and one rail in front, with a seat on strap-hinges to close it up as high as the sides; a box 3 feet 4 inches long, the bottom 5 inches wide, front side $9\frac{1}{2}$ inches deep and $8\frac{1}{2}$ inches at the top in parallel line to the body, all in the clear, to be substantially fastened to the front end of the body; to have an iron strap 1 inch wide passing round each end, secured to the head-piece and front rail by a rivet in each end of it passing through them; the lid to be fastened to the front rail with two good strap-

hinges, a strap of $\frac{5}{8}$-inch iron around the box $\frac{1}{2}$ inch from the top edge and one near the bottom, and two straps, same size, on the lid near the front edge to prevent the mules from eating the boxes; to have a joint hasp fastened to the middle of the lid, with a good wooden cleat on the inside, a strap of iron on the centre of the box with a staple passing through it to fasten the lid to; eight studs and two rails on each side; one bolster fastened to the body, 6 inches deep and 4 inches wide at king-bolt hole; bolster to be fastened to body with a $\frac{1}{2}$-inch bolt in each end; front part of bolster to be 16 inches from front side of front end of sill, and to have a stay under each end and secured to bottom of sill by two bolts; iron rod in front and centre of $\frac{11}{16}$-inch round iron, with a head on the top of rail and nut on lower end; iron rod and brace behind, with shoulders on top of tail-piece, and nuts on the under side, and a nut on top of rail; a plate $2\frac{1}{2}$ inches wide, of No. 10 band-iron, on tail-piece, across the body; four screw-bolts through each side stud, and two screw-bolts through each front stud; bolts to be $1\frac{3}{4}$ inch by $\frac{1}{4}$ inch to secure the lining-boards, one bolt through each end of the rails; floor $\frac{5}{8}$-inch oak boards, well fastened to body-bars by wrought nails clinched at bottom; sides $\frac{5}{8}$-inch white pine; tail-boards $\frac{3}{4}$ inch thick, of white pine, to be well cleated with five oak cleats riveted well and strong at each end through the tail-board; an iron plate 3 feet 8 inches long, $2\frac{1}{2}$ inches wide, and $\frac{3}{8}$ inch thick on the under side of the bed-piece, to extend from the hind end of the body to 8 inches in front of the hind bolsters, to be fastened by the rod at the end of the body by the lateral rod, and two $\frac{3}{8}$-inch screw-bolts, one at the forward end of the plate and the other about equidistant between it and the lateral rod. A $\frac{1}{2}$-inch round iron rod or bolt to pass diagonally through the rails between the two hind studs to and through the bed-piece and plate under it, with a good head on the top and nut and screw at the bottom, to be at the top 1 foot 6 inches from inside of tail-board, and on the bottom 10 inches from the hind rod. An iron clamp 2 inches wide, $\frac{1}{4}$ inch thick around the bed-piece, the centre bolt to which the lock-chain is attached passing through it, to extend 7 inches on the inside of the body, the ends, top, and bottom to be secured by two $\frac{3}{8}$-inch screw-bolts, the middle bar at the ends to be flush with the bed-piece on the lower side. Two lock-chains secured to the centre bolt of the body, one end 11 inches, the other 2 feet 6 inches long, to be of $\frac{3}{8}$-inch round iron; feed-trough sides of yellow pine, to be 4 feet 6 inches long from out to out, the bottom and ends of oak; sides $8\frac{1}{2}$ inches deep, 8 inches wide at bottom, and 12 inches wide at top of feed-box, all in the clear, or inside; well ironed with a band of hoop-iron around the top, one around each end, and three between the ends; strong and suitable irons to fasten them on the tongue when feeding; a good strong $\frac{1}{4}$-inch chain to be attached to the top rail of the body, secured by a staple with a hook to attach it to the trough. The running-gear and the frame-work of the body to be neatly chamfered and rounded.

Brake.

Brake-bar to be made of best white-oak, $2\frac{3}{8}$ inches thick by 7 inches wide, 5 feet 9 inches long; to be made parallel 2 feet 6 inches, then tapered on front side at each end to $5\frac{1}{2}$ inches. Each end of bar on back side to be gained $\frac{1}{2}$ inch deep and 7 inches long, to receive the brake-shoe, so that the front of the brake-block will be on a line with the back of the bar.

Brake-shoe of flat iron on each end 6 inches long, $2\frac{1}{4}$ inches wide, $\frac{1}{2}$ inch thick, bent around 2 inches on each side to receive a brake-block. Bolted to the brake-bar with two $\frac{1}{2}$-inch bolts each.

Brake-blocks to be made of best oak, $3\frac{1}{2}$ inches thick, 6 inches wide, 15 inches long, curved to fit the wheels; tapered gains to be cut on each side of sufficient depth and width so as to fit in the above-described shoe and leave the full surface of the blocks presented to the wheel.

Brake-roller to be of $1\frac{1}{2}$-inch round iron, 5 feet 4 inches long, and about 18 inches, drawn down to $1\frac{1}{2}$ by $\frac{5}{8}$ inch, with two $\frac{7}{16}$-inch holes in the end, 4 inches apart. Two bracket stops 1 by $\frac{1}{2}$ inch, welded on the roller-bar, the first one 2 inches from the end, and one 2 feet 4 inches from the end; these are to keep the roller from shifting lengthwise between the brackets. Two fulcrums, $1\frac{1}{2}$ by $\frac{3}{4}$ inch at roller-bar, drawn to 1 by $\frac{3}{8}$ inch $1\frac{1}{2}$ inch from the end, forming an eye $1\frac{1}{2}$ inch round by $\frac{3}{4}$ inch, with hole for $\frac{1}{2}$-inch bolt; the first fulcrum welded on the bar

$7\frac{3}{4}$ inches from the end of the roller, the other $23\frac{1}{2}$ inches, and the fulcrums to measure $4\frac{3}{4}$ inches from the centre of the hole to the centre of the roller-bar when finished; the flat end of the bar bent up in a gentle curve in the round part at right angles for a lever 2 feet high; the roller to measure 3 feet 6 inches from out to out when bent, and the top of the lever to stand 10 inches back of a straight line when the fulcrums hang perpendicular in place.

Brackets.—Two brackets which hold the roller-bar in place should be 2 feet 5 inches long, of $\frac{7}{8}$-inch round iron, with a clip-tie welded on $1\frac{3}{4}$ by $\frac{1}{4}$ inch with holes in, to take the hind axle bolts; then 7 inches from the axle form an eye on the brackets $2\frac{1}{2}$ by $\frac{7}{8}$ inch, with a hole in $1\frac{9}{16}$ inch to receive the roller-bar; then 6 inches of the front end flattened to bolt to the hind hounds with two $\frac{1}{2}$-inch bolts each, this also taking the place of the hind axle braces.

Brake-hangers.—Two brake-bar hangers 3 feet 2 inches long whole length; top end $1\frac{1}{2}$ by $\frac{1}{4}$-inch iron, welded to 1 foot 2 inches of 2 by $\frac{1}{4}$-inch iron, with a T welded on the bottom end $1\frac{3}{4}$ inch wide, $\frac{1}{4}$ inch thick, $4\frac{1}{2}$ inches long, with one $\frac{11}{16}$-inch hole in each, 5 inches from the bottom end, slightly countersunk on both sides, with $\frac{1}{2}$-inch round iron link $9\frac{1}{2}$ inches long in the clear, with a 3-inch eye-bolt welded in the lower end to bolt through the brake-bar, 3 inches of the top end bent over the top rails and bolted to the top. Middle and bottom rails with three $\frac{3}{8}$-inch bolts, 4 feet 10 inches from the front end of the body; the top of the brake-bar to hang 3 feet $4\frac{3}{4}$ inches from the top of the body.

Lever-bracket.—One lever bracket $5\frac{1}{2}$ inches long, $\frac{5}{8}$-inch round iron, with a $\frac{5}{8}$-inch collar welded on $3\frac{1}{4}$ inches from one end, with a screw and nut to bolt through the centre of the bed-piece or bottom rail, 17 inches from the front end of the body, with nut, washer, and screw on the outer end to take the lower end of the brake-lever.

Brake-lever to be 4 feet long, $1\frac{1}{2}$ by $\frac{9}{16}$ inch iron, $\frac{3}{4}$-inch hole in the bottom end, with three $\frac{7}{16}$-inch draw-rod holes 3 inches apart; the first one $10\frac{1}{2}$ inches from the centre of the bottom hole; the lever-catch $3\frac{1}{2}$ inches long formed 20 inches from the centre of it to the centre of the bottom hole, a 2-inch eye on the top end; the lever drawn down to 1 by $\frac{9}{16}$ inch under the eye, and tapered back 15 inches; the top of the lever bent in an ogee shape 6 inches forward of a straight line.

Brake-ratchet, whole length 3 feet 4 inches, one piece, 2 by $\frac{1}{4}$-inch iron, 15 inches long, with 8 teeth, $1\frac{1}{2}$ inches from centre to centre and 1 inch deep, welded to one piece of $1\frac{1}{4}$ by $\frac{3}{8}$-inch iron, $11\frac{1}{2}$ inches long, bent around edgewise $2\frac{1}{2}$ inches from the front tooth on a circle of $2\frac{1}{2}$ inches, on a parallel line with the ratchet side, then bent 4 inches of the end out edgewise at right angles; then bent the same 4 inches down square to fit the front stud on the body and bolted to it with two $\frac{3}{8}$-inch bolts; then weld on the back end of the ratchet 15 inches of $\frac{3}{4}$-inch round iron, and on the end of this weld a T 1 foot long, $1\frac{1}{2}$ by $\frac{5}{16}$-inch iron, 4 inches from the lower end of it. This T to have a hole in each end to fasten to the top and middle rails with two $\frac{3}{8}$-inch bolts, a guard 21 inches long of $\frac{1}{2}$-round iron to fasten to the ratchet on a parallel line $1\frac{1}{2}$ inch from the teeth to keep the lever from whipping against the cover of the wagon; the outer edge of the teeth in the ratchet to stand out 4 inches clear of the body studs.

Draw-rods.—Two draw-rods 2 feet 7 inches long, $\frac{5}{8}$-inch round iron, with slot clevis made of $1\frac{1}{2}$ by $\frac{1}{4}$-inch iron on one end to fasten to the roller fulcrums with two $\frac{1}{2}$-inch bolts; the front end to have screws cut 10 inches long, and to pass through the brake-bar, with a nut on each side of the bar, which will allow the bar to be let out or taken up as the blocks wear out.

Brake-rod to be $\frac{1}{2}$-inch round iron, with clevis formed on each end of $1\frac{1}{4}$ by $\frac{1}{4}$-inch iron, to connect the brake together with two $\frac{3}{8}$-inch bolts.

Six bows, of good ash or oak, 2 inches wide and $\frac{1}{4}$-inch thick, with three staples to confine the ridge-pole to its place; two staples on the body to secure each end of the bows; one ridge-pole 12 feet long, $1\frac{3}{4}$ inch wide by $\frac{5}{8}$ inch thick; two rings on each end of the body to close and secure the ends of the cover; a staple in the lower rail, near the second stud from each end, to fasten the side cords; the cover to be of the first quality cotton duck, 10-oz., $28\frac{1}{2}$ inches wide, army standard, cut 15 feet long and four widths of material, made in the best manner, with four hemp cords 30 inches long on each side and one through each end 13 feet long to close it at both ends. The outside of the body and feed-trough to have two good coats of white lead,

coloured to a blue tint; the inside of them to have two coats of Venetian red paint; the running-gear and wheels to have two good coats of Venetian red darkened to a chocolate colour; the hub and felloes to be well pitched instead of painted, if required.

The extra *king-bolt* and two extra *single-trees* to be furnished with each wagon, the king-bolt and single-trees similar in all respects to those belonging to it.

Each side of the body of the wagon to be marked U.S., and numbered as directed; all other parts to be lettered U.S.; the cover, feed-box, bolts, and linch-pins for each wagon to be put up in a strong box (coopered) and the contents marked thereon. Each wagon to be marked with the name and residence of the maker.

It is agreed and distinctly understood that the wagons are to be so constructed that the several parts of any one wagon will agree and exactly fit those of any other so as to require no numbering or arranging for putting together, and all the materials used for their construction to be of the best quality, all the wood thoroughly seasoned, and the work in all parts faithfully executed in the best workmanlike manner.

The work shall be inspected from time to time as it progresses by an officer or agent of the Quartermaster's Department, and none of it shall be painted until it shall have been inspected and approved by said officer or agent authorized to inspect it.

Weight of wagon about 1,950 pounds.

Harness.

Specification of the size, &c., for Six-Mule U.S. Army Wagon.

Wheel.

Two quilors.—Breech-straps 3 feet 6 inches long, 3½ inches wide, sewed into 4-inch rings of ⅜-inch iron.

Hip-straps, 3 feet 11 inches long, 2½ inches wide.

Stay-pieces, 2 feet long, 2½ inches wide, with 1½-inch buckles.

Cross-straps to buckle into stay-pieces, 6 feet long, 1½ inch wide.

Side-straps, 4 feet long, 1½ inch wide.

Tie-straps, 15 inches long, ½ inch wide, tapering to a point at both ends.

Two belly-bands.—Long side 2 feet 3 inches long, 2 inches wide, with a 2-inch buckle; short side 1 foot 5 inches long and 2 inches wide.

Two hair collars, 18 to 19 inches long, with single straps and safe-leathers, and buckle 1 inch wide, and to be high-peaked.

Two pairs strong hames to suit, of white-oak root, ironed, with hooks, breast-rings 1½ inch square, staples and line-rings.

Two pairs hame-straps, lower one 5 feet 6 inches long, ½ inch wide; upper one 4 feet 6 inches long, ½ inch wide, of alum-tanned leather.

Two choke-straps, 3 feet 2 inches long, 2 inches wide, 2-inch roller buckle; billet 20 inches long.

Two bridles.—Crown piece 2 feet long, 1¾ inch wide, to be split so as to form straps to receive the buckles of *throat-latch*.

Cheek-pieces, each 10 inches long, 1 inch wide, cut 2 feet 10 inches long, to form billet for bit.

Front pieces, 11½ inches long, 1 inch wide.

Stay-pieces, from blinds to crown piece, 16 inches long, 1½ inch wide. No nose-piece.

Blinds, 10 inches long, 5¼ inches wide in swell, to be half-oval shaped.

Reins.—Long side 4 feet long, 1 inch wide; short side 2 feet long, 1 inch wide, with 1-inch buckle.

Throat-straps, 19 inches long, ¾ inch wide, buckle at each end.

Bit, wrought-iron, japanned, bright mouth, jointed, to weigh 7 pounds to the dozen.

One chin-chain, 10 inches long, of No. 8 iron, short-twisted links, with S-hook at each end and 1½-inch ring in centre.

One coupling strap, 6½ feet long, 1 inch wide, with 1-inch buckle.

Two pairs chain pipes, 2 feet 6 inches long, 2½ inches wide.

Two pairs trace-chains, 7 feet long, 12 twisted links to the foot, of No. 2 iron, with hooked T on one end, heavy swivel in centre of chain; on front end of trace-chain 6 straight links No. 1 iron, 2½ inches long, weight 10 pounds per pair; (iron to be of the best quality).

One pair breast-chains, 28 inches long, 14 twisted links to the foot, of No. 2 iron; weight 4 pounds per pair.

Two neck-straps, 3 feet 1 inch long, 2¼ inches wide, with 2¼-inch buckle.

Two neck-chains, 4 feet 6 inches long, 14 twisted links to the foot, of No. 4 iron; T and loop to be riveted on to the neck-strap: swivel in chain; weight 6 pounds per pair.

One saddle, made on tree of the kind known as "Morgan;" the head and gullet in one piece (solid fork); to be covered in the usual manner with raw-hide; leather flaps running under the tree and extending 6 inches below the girthing D; three girthing straps 1¼ inch wide each—one running across the tree in front of pommel to the D on the opposite side, another round the pommel to the D's on each side, and the other from the same D's to the extension of the bar behind the cantle, all fastened to the tree with brass screws; one lacing strap on each side from the D's 1¼ inch wide, 3 feet long, tapering to a point; one hair girth 16 inches long, 4 inches wide at the middle, a 2½ inch ring on each side; stirrup leather 2 inches wide, 5 feet long, with 2-inch buckles; fenders, or leg-guards 17 inches long, 6½ inches wide at top, 8½ inches wide at bottom. The fender to be removable at pleasure.

Heavy wooden stirrups, 4 inches wide on bottom; 2 rivets.

Four collars, 17½ to 18 inches long, made same as for wheel harness.

Four pairs hames to suit, of same material as for wheel harness, ironed, with hooks, rings, and staples, and with straps, as in wheel harness.

Four bridles, same as for wheel harness.

Four neck-straps and *chains*, as for wheel harness.

Four belly-bands, as for wheel harness.

Four pairs chain-pipes, as for wheel harness.

Four pairs trace-chains, as for wheel harness.

One bearing-chain, 4 feet long, 14 twisted links to the foot, of No. 4 iron, with a hooked T on each end and 1¾-inch ring in middle.

Four cruppers and hip-straps.—Back strap 5 feet long, tapering from 3½ inches to 2½ inches wide; hip-straps each 2 feet 4 inches long, 1½ inch wide, each with 3-inch rings, and a small open ring or S-hook to attach it to trace-chain.

Four back-bands, 3 feet 4 inches long, 3¼ inches wide.

One martingale, 4 feet long, 1½ inch wide—to buckle into bit.

Four coupling-straps, 5 feet 6 inches long, ⅞ inch wide.

One check-rein, 4 feet 1 inch long, 1 inch wide—to buckle into the bit at each end, with a ring sewed in the centre to receive the lead line.

One jockey stick—to be of hickory, split with the grain—not sawed—4 feet 6 inches long, with chains, a T at end of one chain and a snap at end of the other; chains to be 10 inches long, of No. 8 iron.

One lead-line, 28 feet long, 1 inch wide, with buckle at one end and an 8-inch loop at the other.

Two lead-line rings, 3 inches in diameter, to be attached by a leather strap 12 inches long, 1 inch wide, with buckle; one to the line-ring in the near hame of the near swing mule, the other to the back strap over hip-strap of the near lead mule, the lead-line to pass through these two 3-inch rings.

One whip—black-snake, 5 feet 6 inches long, 1½ inch in diameter at the butt.

The whole, except jockey stick, to be packed in a box 20 inches wide, 20 inches deep, and 36 inches long, of 1-inch stuff, coopered with wood hoops or iron, as may be required.

The whole to be made of the best material—(leather of best quality, oak-tanned), sewing to be made with good waxed thread; and in addition, the quilors, belly-bands, back-bands, cruppers and hip-straps, chain-pipes, neck-straps, and choke-straps to have one No. 9 copper rivet and burr between each two rows of stitches; japanned, malleable, barrel-pattern buckles to be used throughout, and subject to inspection during process of manufacture and also when finished.

Weights of the various parts of a complete set of standard six-mule U.S. Army wagon harness, in use at the Fort Leavenworth, Kans., depôt of the Quartermaster's Department, U.S.A.

No.	Articles.	Wheel for two mules.	Lead for four mules.	Total.
		lbs.	lbs.	lbs.
4	Back-bands	..	$4\frac{14}{16}$	$4\frac{14}{16}$
6	Belly-bands	$1\frac{11}{16}$	$3\frac{5}{16}$	5
1	Bearing-chain	..	$2\frac{8}{16}$	$2\frac{8}{16}$
2	Breast-chains	$4\frac{12}{16}$	..	$4\frac{12}{16}$
6	Bridles	$6\frac{8}{16}$	13	$19\frac{8}{16}$
6	Pairs chain-pipes	$4\frac{4}{16}$	$8\frac{8}{16}$	$12\frac{12}{16}$
1	Chin-chain	$\frac{4}{16}$	..	$\frac{4}{16}$
1	Check-rein	..	1	1
2	Choke-straps	2	..	2
6	Collars—two 17½ in., two 18 in., two 19 in.	11	$20\frac{8}{16}$	$31\frac{8}{16}$
5	Coupling-straps	$\frac{8}{16}$	$1\frac{8}{16}$	2
4	Cruppers, with hip-straps	..	$10\frac{8}{16}$	$10\frac{8}{16}$
6	Pairs hames	8	$15\frac{8}{16}$	$23\frac{8}{16}$
12	Hame-straps	$\frac{10}{16}$	$1\frac{12}{16}$	$1\frac{12}{16}$
1	Jockey-stick	..	$2\frac{8}{16}$	$2\frac{8}{16}$
1	Lead-line	..	$2\frac{4}{16}$	$2\frac{4}{16}$
2	Lead-line rings	..	$1\frac{2}{16}$	$1\frac{2}{16}$
1	Martingale	..	$\frac{6}{16}$	$\frac{6}{16}$
6	Neck-straps and chains	8	16	24
2	Quilors	12	..	12
1	Saddle	$12\frac{8}{16}$	..	$12\frac{8}{16}$
6	Pairs trace-chains	22	44	66
1	Whip	..	$1\frac{4}{16}$	$1\frac{4}{16}$
		$94\frac{1}{16}$	$149\frac{9}{16}$	$243\frac{10}{16}$

Wagon.

Specification for Two and Four-Mule U.S. Army Wagon.

See Drawings Nos. 3, 4, and 5.

Body.—The body to be straight, 3 feet 4 inches wide, 1 foot 9 inches deep, 9 feet 6 inches long at the bottom, and 10 feet at the top, sloping equally at each end, all in the clear or inside.

Sides, &c.—The sides, strips, head and tail-board, and tool-box of white pine.

Floor.—The floor of yellow pine and the bars of white oak; the floor 9 feet 10½ inches long, 3 feet 4 inches wide, ⅞ inch thick.

Sides.—The sides 22 inches wide, ⅞ inch thick, 9 feet 9½ inches long at bottom, with four strips or cleats of white oak 3¼ inches wide, 1 inch thick on the outside, to keep the body in place between the standards; the front one placed 1 foot 7½ inches from the front end and the other 2 feet 6 inches from the back end; a strip 4½ inches wide, ⅞ inch thick on outside at the bottom, the whole length of side between the cleats; all the strips, cleats, and the floor well nailed with clinch-nails; the top edge of sides and ends of body ironed with hoop-iron ⅞ inch wide, ⅛ inch thick, fastened with screws; two oak strips 2 feet long, 2½ inches wide, 1¼ inch thick, bolted to the under side of body, back of the hind bolster, with three ⅜-inch bolts in each.

Iron straps.—Eight iron straps (four on each side of body), 20 inches long, 1½ inch wide, ¼ inch thick, with both edges swedged down to a feather edge, with a

$\frac{1}{2}$-inch round shank and nut on the bottom to secure the bars, and fastened to the inside of sides with four rivets in each; the first strap placed 5 inches from the front end of side, to receive a bottom bar 3 feet 10 inches long, $3\frac{1}{4}$ inches wide, $1\frac{1}{2}$ inch deep; the second strap 4 feet 2 inches from front ends, to receive a bar 4 feet 6 inches long, $3\frac{1}{2}$ inches wide, $1\frac{3}{4}$ inch deep, with an iron brace on the outside 20 inches long, of $\frac{3}{8}$-inch round iron, with $1\frac{1}{4}$-inch shoulder, resting on centre-bar; a $\frac{1}{2}$-inch shank and nut on bottom, and three bolts through brace, side, and strap, and three rivets through side and strap at the top and bottom; the third strap 6 feet $3\frac{1}{2}$ inches from front end, to receive a bar 4 feet long, $3\frac{1}{4}$ inches wide, $1\frac{1}{2}$ inch deep; the tail strap placed even with the end of side at the bottom to receive the tail-bar, 4 feet 6 inches long, $3\frac{1}{2}$ inches wide, $1\frac{3}{4}$ inch deep, with a brace on the outside 20 inches long, of $\frac{3}{8}$-inch round iron, with $1\frac{1}{4}$-inch shoulder, resting on end bar; a $\frac{1}{2}$-inch shank and nut on lower end, the top flattened out to $1\frac{1}{4}$ inch wide, $\frac{1}{4}$ inch thick, and bent out back to form the eye through tail-gate, bolted through the sides and straps with 4 bolts, and to have 3 rivets through sides and straps; a loose ring, $2\frac{1}{2}$ inches in diameter, of $\frac{3}{8}$-inch round iron, through a shank riveted to brace at top to receive the tail-chain; feed-box chain 11 inches long, including hook, is also attached to this ring.

Tail-gate.—Tail-gate 3 feet 9 inches long, 1 foot 8 inches wide in middle, and 1 foot 6 inches wide at the ends, $\frac{7}{8}$ inch thick, to close up against the ends of sides, hung with three strap-hinges $1\frac{1}{2}$ inch wide, $\frac{1}{4}$ inch thick, reaching to top of gate, fastened with five rivets in each hinge and three eye-bolts through tail-bar, and a $\frac{7}{16}$-inch round rod through hinges and eye-bolts. A plate $2\frac{1}{2}$ inches wide, $\frac{1}{8}$ inch thick, on the inside and outside at each end of gate, reaching from top to bottom, riveted with 7 rivets in each. A pin through eye (to hold up the gate), attached to bolt at top of brace by a small chain; a staple of $\frac{3}{8}$-inch round iron, 2 inches wide, riveted in hinges near the top, to receive a chain 7 feet 6 inches long, links of $\frac{3}{16}$-inch iron, with a hook at one end and a ring at the other; the tail-bar and floor placed 1 inch outside of the ends of side boards so that the tail-gate will shut on top of floor.

Head-board.—Head-board $21\frac{1}{2}$ inches high, $\frac{7}{8}$ inch thick, with two pine cleats 4 inches wide, $\frac{7}{8}$ inch thick, placed $6\frac{1}{4}$ inches from each end, well nailed with clinch-nails, held in place by 4 oak cleats on inside of side boards, with a tool-box fastened to front side.

Tool-box.—Tool-box 3 feet long, 10 inches deep on front side, $5\frac{1}{2}$ inches wide at bottom, and $8\frac{1}{2}$ inches at top, with a lid hung with two T-hinges and a joint hasp in the middle, and well ironed with hoop-iron $\frac{3}{4}$ inch wide, passing around each end and along the top edge and fastened to front board; a $\frac{3}{8}$-inch round rod across the body, in front of head-board and above the lid of tool-box, with a handle on one end and a nut on the other.

Side plates.—Four plates $5\frac{1}{2}$ inches high, 3 inches wide, $\frac{1}{8}$ inch thick, on outside of body at standards, turned under the body one inch where it rests on the bolsters.

Bows.—Six bows, of good ash or oak, 2 inches wide, $\frac{1}{4}$ inch thick, with three staples to confine the ridge-pole to its place; the front bow fastened to the second bow with two $\frac{1}{4}$-inch bolts 18 inches from lower end, and at the top with a leather strap 31 inches long, $1\frac{1}{2}$ inch wide; two staples in sides of body to secure each end of bow.

Ridge-pole.—One ridge-pole 8 feet 8 inches long, $1\frac{3}{4}$ inches wide, $\frac{5}{8}$ inch thick.

Rings.—Four rings on each side of body to fasten the cords of the cover.

Seat-boards.—Seat-board 3 feet $4\frac{3}{4}$ inches long, 14 inches wide, $\frac{7}{8}$ inch thick, with ends and back; ends 5 inches wide; back 6 inches wide in centre and $\frac{7}{8}$ inch thick, of white pine, secured by four corner plates $4\frac{1}{2}$ inches long each way, $\frac{7}{8}$ inch wide, $\frac{3}{16}$ inch thick, fastened with six wood screws in each; the seat to rest on top of two elliptic springs 26 inches long, $1\frac{1}{2}$ inch wide, two leaves each, to rest on uprights 2 feet $5\frac{1}{2}$ inches long, $1\frac{1}{2}$ inch wide, $1\frac{1}{4}$ inch thick, of white oak, bolted to insides of body with eight $\frac{3}{8}$-inch bolts. Three movable seat-boards 3 feet $3\frac{1}{2}$ inches long, 12 inches wide, $\frac{7}{8}$ inch thick, with oak cleats on under side, to rest on two side bars of hickory 8 feet 4 inches long, $2\frac{1}{2}$ inches wide, $1\frac{1}{2}$ inch thick, with four elliptic springs 28 inches long, $1\frac{1}{2}$ inch wide, three leaves each, resting on four iron straps 17 inches long, $1\frac{1}{2}$ inch wide, $\frac{5}{16}$ inch thick, bent over and resting on top edge of sides of body.

Foot-board.—A foot-board on the front end of body, 3 feet 4 inches long, 14 inches wide, $\frac{7}{8}$ inch thick, of yellow pine, held in place by two $\frac{5}{8}$-inch iron braces $19\frac{1}{2}$ inches long, flattened at each end, and two rests $19\frac{1}{2}$ inches long, 1 inch wide, $\frac{3}{8}$ inch thick, secured to front head-board with four $\frac{3}{8}$-inch bolts and to the foot-board with eight $\frac{5}{16}$-inch bolts.

Lock-chains.—Two lock-chains, one end 11 inches long, the other 2 feet 6 inches long, of $\frac{5}{16}$-inch round iron, attached to side of body by a forked clip with four bolts in each, and with a hook on the side of body to hang chain on.

Plates.—Two plates 7 inches long, $1\frac{1}{2}$ inch wide, $\frac{1}{4}$ inch thick, with two bolts in each, for the front wheels to strike against in turning the wagon.

Brake.—A saw or ratchet $23\frac{1}{2}$ inches long, $1\frac{1}{4}$ inch wide, and $\frac{3}{4}$ inch thick, with arms 11 inches long, bolted on the right or off-hand side of the body, near the front end, with two $\frac{3}{8}$-inch bolts at each end, with two iron plates on inside of side boards underneath the bolt heads; a guide of $\frac{1}{2}$-inch round iron on the inside of lever, with the ends flattened and bolted to the ratchet arms, with one (1) $\frac{3}{8}$-inch bolt at each end; a lever with jaws, for foot or hand use, 50 inches long, $1\frac{1}{4}$ inch wide, $\frac{1}{2}$ inch thick, to retain this size two feet from the lower end, then taper to one (1) inch wide at top end, with a foot-rest bent outwards at right angles, $4\frac{1}{2}$ inches, and bent back 1 inch; 5 inches from the top end, lever curved forward 9 inches from ratchet, ending below in an eye to receive $\frac{5}{8}$-inch bolt welded to a forked plate 10 inches long, $\frac{3}{8}$ inch thick at shoulder, securely attached to the under side of bottom of body with three $\frac{3}{8}$-inch bolts; connecting-rod 6 feet long, of $\frac{1}{2}$-inch round iron, attached to front lever by a fork, $1\frac{1}{4}$ inch by $\frac{1}{4}$-inch iron, with bolt through both $11\frac{1}{2}$ inches from lower end of lever; the back or rear end secured to back lever in like manner; back lever or roller-bar $1\frac{3}{8}$-inch round iron, 3 feet $5\frac{3}{4}$ inches long, to where end bent upward $22\frac{1}{2}$ inches and flattened to $1\frac{1}{2}$ inch wide, by $\frac{1}{4}$ inch thick, with eye to attach connecting-rod, with two fulcrums each $4\frac{1}{2}$ inches long, $1\frac{1}{2}$ inch wide at roller, by $\frac{3}{4}$ inch thick, and $1\frac{1}{2}$ inch by $\frac{5}{8}$ inch at lower end, with eye to attach the two fulcrum-rods, fulcrums 20 inches apart; a guide securely attached to roller-bar on the inside of each bracket; the roller brackets are formed of $\frac{7}{8}$-inch round iron, with eyes through which the roller passes 6 inches in front of the hind axle, with clip fastening under the axle, and bolted to the under side of the hind hounds 20 inches in front of hind axle, with two $\frac{3}{8}$-inch bolts in each, bolts $8\frac{1}{2}$ inches apart; two fulcrum-rods 2 feet 6 inches long, $\frac{5}{8}$-inch round iron, with a fork of $1\frac{1}{4}$ by $\frac{1}{4}$-inch iron, connecting fulcrum with a $\frac{3}{8}$-inch bolt through each, and connecting brake-bar with nuts on rods at each side of the bar to take up the wear in the block and to adjust the bar to the proper purchase upon the wheels; brake-bar of oak or hickory, 5 feet 8 inches long, 5 inches wide at fulcrum-rods, and tapering to $3\frac{1}{8}$ inches wide at each end, $1\frac{7}{8}$ inch thick, with a clip at each end $5\frac{1}{4}$ inches long, 2 inches wide, $\frac{3}{8}$ inch thick, bent around $1\frac{1}{2}$ inch on each side to receive the rub-blocks, which are to be 5 inches wide, $2\frac{1}{2}$ inches thick, 11 inches long, the clips bolted to the bar with two $\frac{3}{8}$-inch bolts each, one bar 3 feet $9\frac{1}{2}$ inches long, $5\frac{1}{2}$ inches wide, 2 inches thick, bolted to top of hounds with four $\frac{3}{8}$-inch bolts, the bar tapering from hounds to $2\frac{1}{2}$ inches wide at each end; the hangers which attach the hound-bar to the brake-bar, two links of $\frac{1}{2}$-inch round iron, 8 inches long, with eye-bolts $\frac{3}{8}$-inch round iron, the eye-bolts attached to hound-bar to extend down $3\frac{1}{2}$ inches, flattened at lower end to $2\frac{1}{2}$ inches wide, $\frac{3}{16}$ inch thick, forming a guide for connecting link, which is closed in the centre; the hook and link portable attachment of the hound-bar to the bed, a strap of iron 2 inches wide, $\frac{1}{4}$ inch thick, extending 4 inches on the under side of hound-bar, which eye-bolts pass through and hold in place, bent up 3 inches at end of bar, top end rounded with eye to receive links, two links at each end of hound-bar 2 inches long, $\frac{3}{8}$-inch round iron; two straps $1\frac{1}{8}$ inch wide, $\frac{3}{16}$ inch thick, 8 inches long, and bolted on each side of bed with two $\frac{3}{8}$-inch bolts each, with a hook on lower end to receive connecting links.

Tongue.—The tongue to be 10 feet 6 inches long, 4 inches wide, $2\frac{1}{4}$ inches deep at front end of hounds, $1\frac{3}{4}$ inch wide, and $2\frac{1}{4}$ inches deep at point of front end, and so arranged as to lift up the front end of it to hang within 2 feet 6 inches of the ground when the wagon is standing at rest on a level surface; the tongue-cap to be of $\frac{5}{8}$-inch round iron, welded to side pieces 2 inches wide, $\frac{5}{8}$ inch thick, and 13 inches

long, bolted with three $\frac{5}{16}$-inch bolts to the tongue; a plate $3\frac{1}{2}$ inches square nailed on top where double-tree rests; a hasp for double-tree 10 inches long, 2 inches wide, $\frac{1}{4}$ inch thick, fastened to tongue by a staple; double-tree hammer, or bolt, $8\frac{1}{2}$ inches long, of $\frac{3}{8}$-inch round iron; staple in top of tongue for feed-box, 4 feet $1\frac{3}{4}$ inch from the centre of double-tree bolt; two rings 6 inches in front of feed-box staple.

Front hounds.—Front hounds 6 feet long, $2\frac{1}{4}$ inches deep, $3\frac{1}{2}$ inches wide over axle, and to retain that width to the back end of tongue; jaws of hounds 1 foot 6 inches long and $2\frac{1}{4}$ inches square at the front end, with a plate of iron $1\frac{3}{4}$ inch wide, $\frac{3}{8}$ inch thick, fastened on top of hounds over the back end of tongue with a $\frac{3}{8}$-inch screw-bolt in each end, and a plate of iron of the same size turned up at each end 2 inches to clasp the front hounds together, and fastened on the under side and at the front end of hounds with a $\frac{3}{8}$-inch screw-bolt through each hound and a $\frac{3}{8}$-inch key-bolt through tongue and hounds, in the centre of jaws, to secure the tongue in the hounds; two plates 2 inches square, fastened with four nails on outside of jaws, at bolt-holes; a plate 1 foot 6 inches long, $2\frac{1}{4}$ inches wide, of No. 8 iron, secured on the inside of each jaw of hounds with two $\frac{1}{4}$-inch countersunk bolts, and a plate of same dimensions on each side of tongue where the tongue and hounds rub together, secured with two rivets; a brace of $\frac{5}{8}$-inch round iron to extend from under the front axle and take two bolts in front part of the hounds, the same brace to extend rearward to the back part of hounds and to be fastened with two bolts, one through slider and hounds and one through hounds 4 inches in front of slider; a brace or guard over sand-bolster of $\frac{1}{2}$-inch square iron, 2 feet 4 inches long, with a bolt in each end to fasten it to the hounds; the opening between the jaws of hounds to receive the tongue $4\frac{7}{16}$ inches wide in front and $4\frac{3}{16}$ inches at the back part of jaws.

Sand-bolster.—The lower or sand-bolster 4 feet 6 inches long, $3\frac{1}{2}$ inches wide, 3 inches deep, fastened with four $\frac{1}{2}$-inch screw-bolts through bolster, hounds, axle-stock, and braces.

Slide-bar.—Slider 4 feet 1 inch long, $1\frac{3}{4}$ inch wide, 2 inches deep, with a plate on top 4 feet long, $1\frac{1}{4}$ inch wide, $\frac{1}{4}$ inch thick, fastened at each end by a screw-bolt through the slider, hounds, and lower brace, and a rivet in the centre; the upper and lower bolsters each to have a plate 10 inches long, 3 inches wide, $\frac{3}{8}$ inch thick, with the corners drawn out and turned over on the sides of bolsters, with a nail in each corner and four countersunk nails through plates.

Front axle.—Axle-stock 4 feet $\frac{1}{2}$ inch long, $3\frac{1}{2}$ inches wide, $3\frac{1}{2}$ inches deep, fastened to axle with clips $1\frac{1}{4}$ inch wide, $\frac{1}{4}$ inch thick at ends, and a bolt through axle and stock at 6 inches each side of centre, and two hooks for stay-chains.

Front or loose bolster.—Loose bolster 4 feet 5 inches long, $3\frac{1}{2}$ inches wide, $4\frac{1}{2}$ inches deep in the middle and 3 inches deep at ends, with standards 15 inches high, $2\frac{3}{4}$ inches wide, 1 inch thick, with a tenon 2 inches wide into bolster, with a plate 6 inches long, 1 inch wide, $\frac{1}{4}$ inch thick, nailed to the inside edge; a strap $\frac{3}{4}$ inch wide, $\frac{5}{16}$ inch thick, on bolster under shoulder of standard, and turned down 2 inches on each side of bolster, with a rivet through bolster; a plate 2 inches wide, $\frac{5}{16}$ inch thick, on bolster close to inside of standard, turned down 2 inches on each side of bolster, with two nails in each side and one nail in top; a $\frac{3}{8}$-inch bolt through bolster and standard; two hooks in rear side of bolster, 14 inches each side of centre, and clinched on front side, to receive two chains 22 inches long, bolted to each side of the coupling-pole 18 inches from king-bolt; width between standards 3 feet $6\frac{1}{2}$ inches, to receive body 3 feet 6 inches wide, outside.

Hind hounds.—Hind hounds 4 feet 11 inches long, $2\frac{1}{4}$ inches deep, $2\frac{3}{4}$ inches wide back, and $2\frac{1}{2}$ inches wide front; jaws 10 inches long and 4 inches wide at the end where they rest on coupling-pole.

Hind bolster.—Hind bolster 4 feet 5 inches long, $3\frac{1}{2}$ inches wide, 3 inches deep, with standards and irons the same as on the loose bolster, fastened with four $\frac{1}{2}$-inch bolts through bolster, hounds, axle-stocks, and braces under axle; a brace under hind hounds and axle of $\frac{5}{8}$-inch round iron, and bolted to hounds 1 foot 8 inches forward of axle.

Hind axle-stock.—Axle-stock 4 feet $\frac{1}{2}$ inch long, $3\frac{1}{2}$ inches wide, $3\frac{1}{2}$ inches deep, fastened to axle with clips $1\frac{1}{4}$ inch wide, $\frac{1}{4}$ inch thick at the ends, and with a bolt

through axle and stock 6 inches each side of centre; jaws of hind hounds fastened together with two bolts through jaws, and a band of 1½-inch No. 10 iron at the end of jaw; a plate 9 inches long, 3½ inches wide, of No. 10 iron, on top of jaw; a loose coupling-band, 1¼ inch wide, ¼ inch thick, around jaws and coupling-pole, with a ⅝-inch bolt, 7½ inches long, through bands, hounds, and coupling-pole.

Coupling-pole.—Coupling-pole (loose) 8 feet 9 inches long, 3½ inches wide, 2⅜ inches deep, with a rivet through front end; a plate 5 inches long, 2½ inches wide, $\frac{5}{16}$ inch thick, nailed on top at king-bolt with six countersunk nails; a rub-plate 8 inches long, 1¼ inch wide, ¼ inch thick, fastened with two rivets on under side, over slider.

Double-tree.—Double-tree 3 feet 10 inches long, 4 inches wide, 1½ inch thick, with two clips for single-tree and two for stay-chains.

Single-tree.—Single-trees 2 feet 8 inches long, 2¾ inches wide, 1½ inch thick, with clip and ring on each end, and a clip in centre with an open ring to attach to double-tree; a plate on under side of double-tree, 6 inches long, 3 inches wide, ⅛ inch thick, and one on top 2 inches square.

Wheels.—Front wheels 3 feet 8 inches, and hind wheels 4 feet 8 inches high.

Spokes.—Sixteen spokes 2 inches wide and 2 inches thick at hub, and 2 inches wide and 1½ inch thick at the felloe.

Felloes.—Eight felloes 2 inches wide, 2⅜ inches deep.

Hubs.—Hubs 9 inches diameter at flanges, 3½ inches diameter at front, 4 inches diameter at back end, 12 inches long, including sand-band 1 inch wide, ¼ inch thick, and a band on front 2¼ inches wide, ¼ inch thick; spokes and felloes pressed together (by the Archibald press or other process) and secured with eight $\frac{9}{16}$-inch screw-bolts through flanges and spokes; box 10 inches long, bored out to a diameter of 2 inches at back or shoulder end and 1$\frac{3}{32}$ inch at front end, or to taper ¼ inch to the foot in length.

Tires.—Tires 2 inches wide, ½ inch thick, fastened with eight screw-bolts, one in each felloe. Spokes and felloes of white oak, thoroughly seasoned; hub of cast-iron with cast-iron bands on each end, the front band a screw-band.

Axles.—Axles, of the best quality American refined hammered iron, 2 inches square at shoulder, tapering down to 1⅜ inch in the middle, with a ⅞-inch king-bolt hole in front axle; arms 10 inches long between shoulder and nut, 2 inches diameter at shoulder, and the taper ¼ inch to 1 foot in length; an ⅛-inch groove the whole length of arm on top to retain the oil; a right- and left-hand thread on end of arms, to be U.S. standard, 1¼-inch V-thread, seven threads to the inch, with a 1⅝-inch six-sided nut or burr 1¼ inch thick, with flange-collar 2½ inches in diameter. Axles to be 4 feet 2½ inches long from outside of one shoulder-washer to the outside of the other, so as to track 5 feet from centre to centre of wheels. Two (2) extra nuts or burrs of the kind prescribed herein for ends of axle-arms to be furnished with each wagon.

Feed-box.—Feed-box, sides of pine, 4 feet long; the bottom and ends of oak; sides 8 inches deep; box 7½ inches wide at bottom, 10½ inches wide at top, outside, well ironed with a band of hoop-iron around the top, one around each end, and three between the ends, with strong and suitable irons to fasten on the tongue when feeding.

Stay-chains.—Stay-chains to connect front axle to double-tree.

All the work to be neatly chamfered and rounded. The outside of body and feed-box to have three good coats of white lead, coloured to a dark leaden blue; the inside to have two good coats of Venetian red paint; the running-gear and wheels to have three good coats of Venetian red and vermilion mixed half and half; all irons and chains to be painted black.

Each side of body of wagon to be lettered U.S. and numbered; all other parts to be stamped U.S.

The body and running-gear to be so put together that they can be taken apart for shipment.

An axle-wrench, tar-pot, and extra king-bolt, two extra nuts for axles, a lead-bar, with stretcher, chains, and single-trees attached, to be furnished with each wagon.

The links of tongue, stay, and feed-box chains to be of ¼-inch iron, lock-chains of $\frac{5}{16}$-inch iron, links not over 2¼ inches long.

Distance from the centre of king-bolt hole to centre of back axle 5 feet 9½ inches,

and from centre of king-bolt hole to the centre of bolt in jaw of hind hounds 1 foot 10 inches; distance from the centre of hind axle to centre of bolt in jaw of hind hounds 3 feet 11½ inches, and from the centre of king-bolt to centre of slider 2 feet 2½ inches; distance between the inside of front and high standards 5 feet 8½ inches, to receive the body, which is 5 feet 8 inches from outside to outside of cleats of sides.

Weight of wagon, about 1,555 pounds complete for four horses or mules.

Harness.

Specification of the Size, &c., for Four-Mule U.S. Army Wagon.

Wheel.

Precisely the same as for six-mule U.S. wagon.

Lead.

Two collars. Two pairs hames. Two bridles. Two neck-straps and chains. Two belly-bands. Two pairs chain-pipes. Two pairs trace-chains. One bearing-chain. Two cruppers and hip-straps. Two back-bands. One martingale. Two coupling-straps. One check-rein. One jockey-stick, the same as for the lead harness of the six-mule wagon.

One lead-line, 21 feet long, 1 inch wide, with buckle at one end and an 8-inch loop at the other.

One lead-line ring, 3 inches in diameter, to be attached by a leather strap 12 inches long, 1 inch wide, with buckle to the back-strap over hip-strap of the near lead mule; the lead-line to pass through this 3-inch ring.

One whip.—"Black-snake," 5 feet 6 inches long, 1½ inch diameter at butt.

The whole, except jockey-stick, to be packed in a box 18 inches wide, 17 inches deep, and 34 inches long, of 1-inch stuff, coopered with wood hoops or iron, as may be required.

Wednesday, March 14, 1883.

LIEUT.-GENERAL SIR C. P. BEAUCHAMP WALKER, K.C.B. (Colonel Queen's Bays), Chairman of the Council, in the Chair.

THE YEOMANRY CAVALRY CONSIDERED AS AN AUXILIARY AND AS A RESERVE FORCE.

By Major C. G. EDWARDS, 2nd W.Y.Y. Cavalry.

I DO not propose to trouble you with more than a very brief outline of the history of the Yeomanry, but, as I hope to demonstrate the possible value of the force in the future, it is necessary to show that it has been of some service to the country in the past.

The Yeomanry is undoubtedly a force of very respectable antiquity; up to the middle of the last century it stood upon a footing analogous to that of the Militia, and indeed the terms "Yeomanry" and "Horse Militia," were synonymous. In 1793 it was reorganized upon the system of the Volunteers of that period, and the oldest regiments of Yeomanry now in existence were formed at that time. In 1796 a very large force was raised in Ireland, the conduct of which it is interesting to glance at, in view of the existing condition of affairs in that country. In the autumn of that year the Government proposed to all loyal subjects in Ireland to embody themselves as Yeomen, in corps similar to those existing in England, and subject to the control of Government. The proposal, though vehemently opposed by the Roman Catholics throughout the country, and even the Presbyterians of Belfast, was embraced with alacrity; the first estimate laid before Parliament for 20,000 men was filled up immediately; in the course of six months it rose to 37,000, and during the Rebellion the Yeomanry force exceeded 50,000, "all of whom," says the Report of the Secret Committee of 1798, p. 5, "were to be depended upon."

This was doubtless a hazardous experiment, after the experience the Government had had with the Volunteers, and some valuable lessons may be deduced from the behaviour of the two forces, recruited, as they necessarily were, from different classes of the community. The Volunteers had become a most dangerous political power, and, says Sir Richard Musgrave, in his Memoirs of the Rebellion, "popularity among this order became a certain step to preferment." This was because the Government, involved in war with France, Spain, and America, and compelled to denude Ireland of regular troops, allowed themselves to be completely intimidated by the Volunteers. Delegates from the force actually assembled at Dublin and propounded reforms of Parliament and other political measures, whilst a grand convention of Volunteers discussed the reform of the Constitution.

The confidence, however, which the authorities reposed in the Yeomanry was not misplaced; the writer I have already quoted goes so far as to say that "they saved the kingdom from impending destruction." During the Rebellion the force was on duty throughout the country; portions of it took part in the so-called battles of Antrim, Saintfield, and other engagements, and in the important affair of Vinegar Hill, when General Lake defeated the French and rebel forces with a loss of 13 guns. Under General Knox, who marched to Tyrone with some 1,500 Yeomanry, they prevented the rebels of county Derry from rising.

In 1807 the Yeomanry were on duty for some months, and it was not until June of that year that the Duke of Wellington was able, writing to Sir Edward Littledale, to say, "I think you may now venture to discontinue the permanent duty of the Yeomanry in Sligo." The remarks of that great leader upon the force are interesting. In May, 1807, he writes to Lord Hawkesbury:

> "I have a very good opinion of the Yeomanry of Ireland. They are disciplined as well as corps of this description can be expected to be, and I doubt very much the policy of attempting to make any improvement in their discipline. I think that both in England and Ireland we have attempted too much in the way of teaching 'parade discipline' to the Yeomanry. . . . The parade discipline which they receive in large bodies would be entirely useless—nay, would embarrass them—when they are called upon to act as light troops."

Possibly the Duke would, under the altered conditions of to-day, modify his views upon the subject of discipline.

Upon the restoration of order in Ireland, the Yeomanry were disbanded, but in England their services were in constant requisition. Until the railway system had reached some degree of perfection, communications in this country were difficult, military stations were few and far between, the police force was an institution of the future, great dissatisfaction existed amongst the lower orders, and riots were of frequent occurrence. Many of these disturbances were of a most serious character, such, for example, as the agricultural, mining, and manufacturing riots, the "Corn Law," the "Plug," the "Chartists," the "Bristol," "Nailers," "Blanketers," and similar outbreaks. The Yeomanry were, in consequence, constantly called out, one regiment, the Staffordshire, being on permanent duty six months in one year. Without entering into details, it will be sufficient to say that the force received the thanks of Parliament on more than one occasion, that it was the object of a congratulatory General Order by the Duke of Wellington, and was frequently thanked by the local authorities. The last occasion upon which any portion of it was called out in aid of the civil power was in 1865.

At one period the establishment of the English branch of the force was over 40,000 men, but, in the interests of economy, it was for many years persistently reduced; of late years, depression in agriculture and trade has saved the authorities the trouble of making such reductions, and the present establishment is only 14,458.

I trust that this sketch will have shown that the antecedents of the Yeomanry would justify any determined efforts to increase their efficiency as a military institution.

It was rumoured not long ago that a fresh attempt to reorganize the force was in contemplation. It is to be hoped that the labours of any Committee which may be assembled for the purpose may be less barren of results than those of their predecessors. Their efforts were abortive, chiefly from the pre-announced determination of the authorities to sanction no suggestions which would involve any addition to the Yeomanry vote, but in no slight degree from a failure to recognize the true character of the force with which they were dealing.

I would ask permission to point out what is the true *rôle* of the Yeomanry, to suggest the advisability of developing and turning to greater advantage the valuable military qualities which undoubtedly exist in the force, and to show that such a development would amply justify a slight temporary addition to the Yeomanry estimates.

It will, in the first place, be logical to indicate the nature of these qualities, always premising that the components of a force, which is essentially territorial, must have characteristics peculiar to different localities. Regiments, for instance, which are raised in manufacturing or mining districts will not possess qualities which are to be found in purely agricultural regiments, and *vice versâ*. Thus the former may be more intelligent in drill, and better mounted than the latter, but will not, as a body, be distinguished by those sporting instincts which render their more bucolic comrades so valuable; at the same time, in some regiments an equal proportion of both classes may be found.

With these reservations, it may be said that the men of the force are hardy and active, the age of privates varying from nineteen to thirty, of non-commissioned officers from twenty-five to forty. Taken as a whole they are good riders, and in every regiment there are splendid horsemen, capable of riding anything anywhere. Accustomed to an out-of-door life they are thoroughly inured to the vicissitudes of our English climate, whilst their daily pursuits give them the power, and frequently the habit, of noticing and forming deductions from natural and physical signs, an accomplishment which no amount of drill or military training can inculcate, which only natural sportsmen and men accustomed to a country life can attain, and which is simply invaluable to the light cavalry soldier. They are fair rifle shots, though, as a rule, their opportunities of ball practice are infrequent; their proficiency, where it exists, is perhaps due to the fact that they are accustomed to use and carry a gun, a habit which recent legislation will not tend to discourage. With proper encouragement a good deal might be done in this direction.

In addition to being fairly good shots and riders, a most desirable combination, the men possess a valuable knowledge of country. Every regiment may be depended upon to furnish guides for any part of its district—men acquainted with every short cut, whether by fence, gap, or gateway, and able to give information obtainable from neither map nor survey, but without which movements in the enclosed parts of England would be attended with extreme difficulty.

The discipline of the Yeomanry is very good; it is maintained by the self-respect of the men, by *esprit de corps*, and affection for the Officers. In most cases the men now serving are sons or nephews of a former generation of Yeomen, who have ridden together in corresponding ranks in the same regiment. In many instances the families of Officers and men have been united for generations in the relationship of landlord and tenant, and hence a feeling exists between the different ranks which has no exact parallel in any other branch of our national forces, and which on active service would develop to such an extent as to become a valuable factor in the utility of the Yeomanry.

The men are, as a whole, well educated: all can read and write, a matter of no small importance for reconnoitrers; a fair proportion can read and understand a map.

A word as to the horses of the force. Most regiments are well mounted, some admirably so, but they all possess this characteristic in common—the horses, like the men, are essentially local. The advantage of this for the discharge of such duties as the Yeomanry ought to perform is obvious; the horses of regular cavalry cannot be too level: they should be like a pack of hounds; but the physical features of this country are so diversified that, if the Yeomanry are to be able to get across it, their horses must come from the districts they represent. If any one questions this, let him take a Leicestershire horse amongst the banks and coombes of Devonshire, or a Devonshire horse into the pastures and oxers of the Midlands, or let him try to ride either of them over the moorlands and stone walls of Yorkshire or Wales.

To summarize, then, the good qualities of the Yeomanry, it may be said that they are, as a whole, active men in the prime of life, well educated, good riders and fair shots; that they are intimately acquainted with their own districts, and naturally possessed of certain instincts most valuable to light cavalry and most difficult to teach; that they are sufficiently well mounted to ride over their own country, and that an excellent feeling pervades all ranks.

It will not be denied that these are valuable military qualities, furnishing admirable material upon which to work; but if we are asked whether they are turned to the utmost advantage, the reply cannot but be in the negative. The fault, however, lies not with the men, but with the system under which they are trained and equipped; they have been made, though it must cause a pang to say so, too much like regular cavalry: the authorities have aimed at a standard which, save under exceptional circumstances, cannot be attained, and which is really not desirable.

It is this which has subjected the Yeomanry to so many criticisms; for men have asked, and not without reason, how cavalry can be produced by an annual training of a few days. It will be well to ascertain, in the first place, what amount of time is available for training; we shall then be in a better position to decide how it may be best employed. Taking three regiments haphazard, one from the North, one from the Midlands, and a third from the extreme South of England, the drills performed in 1882 were as follows. In the first case, the average number attended by each man were 12·3 dismounted,

5·1 mounted. Three of these mounted drills were complete days, the men forming a royal escort, and being on duty twelve hours each day; in addition to the above every man was out for ten days' permanent duty.

The Midland regiment had an average per man of $3\frac{1}{4}$ mounted, $6\frac{1}{2}$ dismounted drills, exclusive of eight days' permanent duty. The third regiment had, per man, 3 mounted and 13 dismounted drills, exclusive of eight days' permanent duty.

It should be observed that most of these drills represent, not, as in the case of the Volunteers, an hour or two at the end of a day's work, but a complete day spared from the duties or business of life; a greater sacrifice of time cannot therefore be expected from the Yeomanry, but is this sufficient to train them as cavalry?

What are the functions of cavalry? They may be broadly classed under two heads—the execution of the charge or shock in battle, and the performance of detached duties. For the first regular cavalry alone can be relied upon, and it is only repeating a truism to say that for such duty any but the best cavalry are worthless: for this reason, if for no other, that a charge, to be satisfactory, against cavalry at any rate, must be executed simultaneously by every unit of the attacking force. To effect this the horses must be so perfectly level in speed, weight, endurance, and training, that even after, if necessary, a long gallop, the actual shock may be delivered with the precision of a machine.

Now under the existing system, it is obviously impossible that Yeomanry can ever be mounted in this way, nor, for the reasons already given, would it be desirable. But the remaining functions of cavalry, including scouting, dismounted service, &c., are, in their proper place, equally important, and for the discharge of these the Yeomanry are specially qualified. Let, then, the notion be discarded that, save under exceptional circumstances, to which allusion shall be made, the Yeomanry can ever be required to charge. Let them discard with it portions of the existing dress and equipment, which are of doubtful value, even for regular cavalry, and let them be supplied with a uniform, weapons, and equipment which, whilst interfering in no way with the discharge of light cavalry detached duties, would render them twice as valuable a force as they are at present.

The change would amount to this, that instead of being trained, dressed, and equipped purely as regular cavalry, they should be trained and armed, &c., as Mounted Rifles, or, if the term is repugnant to the traditions of the force, as Dragoons, in the original sense of the word.

And here let it be understood that conversion into Mounted Infantry is not advocated. The latter should be perfectly trained infantry soldiers, temporarily mounted for strategical or tactical purposes, and when once dismounted able to hold their own against any other infantry. But the time at the disposal of Yeomanry or Volunteers is far too limited to produce either good cavalry or infantry, and it would therefore be as useless as it would be undesirable to attempt to convert the Yeoman into a foot soldier. On the other hand, the natural

qualities of the Yeomanry recruit present him to the drill sergeant already half trained as a mounted rifleman. He can ride, he has an idea of shooting, and if only the notion is dismissed of making him into a trained trooper or a well-drilled foot soldier, it will be found that the time he so cheerfully sacrifices is sufficient to make him into a most valuable auxiliary.

The Yeomanry might take consolation for their conversion from the thought that, from no other class, from no other branch of our regular army, and from neither Militia nor Volunteers, could the material be found from which such a force could be raised.

Tactics.—The Yeomanry, when not detailed for special duties in connection with other troops, would be well adapted for "partisan warfare." Indeed, they are, in "constitution," &c., not unlike the horsemen who, under Jackson, Morgan, Stuart, Pleasanton, Mosby, and others, performed such signal service in the American War of Secession. Sir Lumley Graham, after reciting the numerous campaigns which, in the history of war, have been influenced by this kind of warfare, says:—

> "Partisan warfare is likely to be more largely practised, and to produce greater results than ever in the next great European conflict. . . . The only way of stopping the reconnaissance of a strong force of cavalry, unsupported by infantry, is to meet it with little parties of infantry too mobile to be caught."

Or, which would amount to the same thing, Mounted Rifles.

The tactics of the Yeomanry should, therefore, be influenced by their suitability for this purpose. They should be, when in action, of the simplest character, based upon one all-absorbing idea—an unremitting endeavour to harass and annoy the enemy. Their leader must be ceaselessly on the watch for opportunities of effecting this object. Whether his opponent is marching or manœuvring, advancing or retiring, a position must be taken up from which fire may be opened, at once unexpected, galling, and effective. This fire must be maintained until an attempt is made to dislodge him, when he must mount his men and gallop off to a fresh position, only to renew similar tactics. In the absence of definite orders he will always endeavour to enfilade the enemy. In changing position he may move at full speed, for his horses will not at the end of their gallop be called upon for a greater effort, as in the case of a charge by regular cavalry, but will have an opportunity of getting their wind. The support to the dismounted men must follow at a more steady space for obvious reasons.

In the enclosed portions of England a force able to ride across country, armed with a good rifle, and employing such tactics, would be as unassailable by regular cavalry as by infantry. Being, moreover, always under cover from view, when halted, and being constantly on the move, it would be a waste of time for guns to attack them.

Drill.—The existing system of drill, with one or two exceptions, should not be interfered with. For Mounted Rifles as for regular cavalry, simplicity is the point to be aimed at, and for this quality the so-called non-pivot system is as near perfection as possible. Perhaps

changes of front from the halt would not be often required, but changes of position, formation of line and column from one or the other, and indeed most of the field movements laid down in the regulations, would be useful for Dragoons or Mounted Rifles. It has been stated that all movements in close formation should be avoided by Yeomanry; but whilst it is essential that Mounted Rifles should be as mobile as possible, the necessity of obtaining shelter for led horses, or of the whole force on frequent occasions, renders all movements of value which enable a concentration of units to be effected.

It seems very necessary that mounted troops should always work in two lines, the rear line, or any unit of it, being always regarded as the support of the line in front. This might easily be done in the Yeomanry by working in single rank, which would not meet with the difficulties which it would encounter in the regular cavalry, there being at present no great dearth of Officers in the force.

The day will doubtless arrive when by all cavalry double rank will be considered as antiquated a formation as the triple rank of the old Dragoons, or the four and six ranks of their predecessors. It is contrary to the spirit of modern tactics, it is on active service generally abandoned by us in consequence of the weakness of our squadrons, and it has been condemned as false in principle by such leaders as the "Iron Duke," Sir Harry Vivian, General Bacon, and many others.

For Yeomanry, as for all partially trained horsemen, the advantages of the rank entire formation are very great. For purposes of parade appearances might be saved by closing up the lines to a certain distance; but if the Yeomanry are to be a valuable force, considerations of this kind must not be allowed to stand in the way of really practical innovations.

As a matter of fact, movements by squadron columns, so favoured by the Germans, and destined apparently to be the groundwork of our future field days, would, if practised in rank entire, give all the advantages of the second line with the appearance of double rank.

The ultimate object of any formation of line, or advance in line, should not be, as at present, the attack, but dismounted service. I know how repugnant this idea will be to many of my brother Officers, but if ever the Yeomanry have to form line in the presence of an enemy it will be not to charge but to fire. To all dismounted parties there must of course be some mounted support, and this should at drill be occasionally gratified with a gallop; but the Yeomanry, if intended to be Dragoons or Mounted Rifles, and not cavalry *pur et simple*, should understand that, as a rule, the object of their Commanding Officer, in changing position, suddenly forming line or advancing, will be to gain cover, under which to dismount and pour a hot fire into the enemy. All those movements, then, which hitherto have been succeeded by a wild charge, should be followed by an order to dismount. Some ammunition will be blazed away, but it will not be wasted, the horses will not be fatigued, the men will get handy with their weapons and quick in jumping on and off their horses, and some practical results will be attained. A good deal of interest might be raised in regiments in such drill by giving prizes to the troop that could most rapidly come into action and "limber up" again.

In addition to ordinary field movements, the men should be drilled to advance from a flank or flanks of large or small bodies and extend rapidly. Such a drill would be essential in any attempt to get across country, for no troops in the world could ride in line at ordinary intervals over any natural fence.

The main question, with regard to dismounted service, which has exercised the minds of cavalry leaders is, How many rifles can be brought into action? Under the system laid down by our cavalry regulations, a squadron which has to furnish its own support can only dismount one-fourth of its men. Thus, out of 48 file, 24 being retained as support, only 12 could fire, or 24 men out of 96, a very small proportion.

Assuming that the whole squadron was available to dismount, 48 rifles might be brought into action. In some armies one horseholder is allowed to every three horses on each side of him. The plan of holding four horses has also been tried, the holder remaining mounted. But in the case of Mounted Rifles, whose fire would be delivered from a comparatively unassailable position, behind the fences of an enclosed country, an effort should be made to place more rifles in line. To link horses would at once simplify matters, but when a number of horses are linked it is a very risky, besides being a comparatively slow process; there seems, however, no reason why a modification of this method should not be adopted.

I would suggest that whenever it is proposed to dismount any body of men, it should first be formed into column, either of fours or half troops, the support of course remaining in line. The horses of the dismounted men being immediately under cover would not be likely to be required to advance straight to their front. The whole, not merely the odd or even numbers, would then dismount, the units of the column (fours or half troops) passaging sufficiently. The different units would then link horses in the manner described below, two men being left with each four, *i.e.*, one to every four horses, four with each half troop, or one man to every six horses, whether front or rear rank, the remainder forming to the front or flank of the column as required.

This would give, in the case of a squadron of 48 file, in column of fours, 72; in columns of half troops, 80 rifles, instead of as at present 48.

To render this feasible, I would suggest that the horses should be linked upon the following principle. Upon each side of the bridles there should be a short cheek strap attached at one end to the top ring of the bridoon, and at the other by an ordinary swivel to a ring or loop just below the headband. On dismounting, every man, except the outer flank troopers, unhooks the off strap of his own horse's bridle, and the near strap of his neighbour's, and connects them by the two swivels. The length of each of these straps with swivels is 12 inches, the weight slightly less than $1\frac{1}{2}$ oz. The horses, when linked, stand, as if on pillar reins, at about the usual interval. The plan has the advantage of simplicity, and, so long as no more than the four or six horses watched by one man are connected, does not present the numerous difficulties and dangers of linking in the ordinary way. It

can, moreover, be done far more rapidly, for the action of connecting the horses is momentary. It is an advantage to dismount all the men, and not to leave the horseholders stuck up as marks to show where the led horses are. If it becomes absolutely necessary to move them, horses will always cling together, and by mounting the central horse of his squad, and seizing the reins of the outer horses, a man can keep them together. It should, however, rarely be necessary to hurry up the led horses. The commander of Mounted Rifles should never allow the enemy to get so near him as to jeopardize his dismounted men.

To render this dismounted service more simple, there should be in Yeomanry no such thing as "fours," in the existing sense of eight men abreast. The term should be employed to mean four men only. The word section might then be reserved for the fourth part of a squadron, or half troop, just as in the infantry it represent a fourth of a company. Such a distribution is employed in the Austrian, German, French, and Italian cavalries, and indeed existed with us, under the form of division, but a few years ago. It would represent the "peloton" and "Zug" of our continental neighbours, and one has only to study the daily proceedings of squadrons on active service in the campaigns of 1866 or 1870-71, to recognize the hourly demand which exists for such an organization.

Each of these sections should be led, as in the Austrian cavalry, by an Officer; it is far better to have a permanent commander of a half troop, than to extemporize one when occasion arises. If working in double rank, the junior section leaders of each troop would ride in rear, as a serrefile. If in single rank, whether in one or two lines, in front. This arrangement would not increase the existing establishment of Officers, but would distribute them more effectively.

I would propose a further innovation. The misfortunes of the Austrian army, in 1866, have rendered us too oblivious of the brilliant services performed by their cavalry at that period; but we may imitate them with advantage in many respects. To them we owe, in reality, our emancipation from the cumbrous drill of ten years ago, and the Yeomanry might take yet one other lesson from them. In all field movements, at any rate, let them ride like the Austrian cavalry with both hands, and, if they are armed with that weapon, with undrawn swords. In riding a partially trained horse it is, as every one knows, a great advantage to have the full use of both hands, and if the horse is to be ridden across country it is often essential. The mouth of the animal will, moreover, be improved by the introduction of such a system, and Yeomen will find it more easy to drill correctly. As to riding with swords, the Yeomanry, as Mounted Rifles or Dragoons, should seldom have to use them, and, save when supporting dismounted men or performing parade movements, they should never be drawn. De Brack lays great stress on the importance of not drawing swords until the moment of charging. He says: "If a line draw swords before moving, it betrays their object prematurely to the enemy." Again:—

> "The soldier who has been carrying his sword drawn for a long time loses the freshness of his respect and enthusiasm for his

weapon; but if this same man lays hold of his weapon at a spirited order from his chief at the very moment when he is to make use of it, he grasps it with more force, more eagerness, and strikes with it more energetically."

This opinion was corroborated by the experience of Mosby, Gilmor, and other leaders in the American Civil War.

Before leaving this branch of my subject I must strongly dissent from the opinion occasionally expressed, that the training of the Yeomanry should be confined to reconnoitring and outpost work. It doubtless seems an anomaly that a body of troops whose special *rôle* is supposed to be detached duty should in their training almost entirely neglect it; but the fact is, that before we can utilize any natural aptitude which men may possess for reconnaissance, &c., we must be able to move them with facility in regular formations. But this can only just be obtained in the Yeomanry by working hard at field and parade movements during the training, and that period is so short that the time required for any practical instruction in detached duty cannot be spared. If, then, any attempt is made to substitute a course of reconnaissance or outpost duty for the usual drill, it will be found that the men will gain little information that they did not already possess, and will deteriorate greatly in value as a military body.

But whilst permanent duty should be mainly devoted to drill, every opportunity should be taken during the winter and spring of getting small parties of men together for theoretical and practical instruction in reconnoitring, &c., and in order that troop Officers may possess the necessary qualifications, they should be required to go through a course at Aldershot or elsewhere.

Equipment.—The Yeoman of the future must not look upon his sword, but his rifle, as his chief weapon. Whether this should be the long or short rifle is a moot point. Advocates of the latter say that the long rifle is, under any circumstances, a clumsy weapon to carry mounted, awkward both for man and horse; and if the Yeomanry can be armed with carbines, shooting accurately up to 800 or 900 yards, there does not seem to be much necessity for anything better. It may be said, in support of this theory, that in an enclosed country it is seldom that troops are visible at a greater range, and any weapon would be of little use at long distances, except in the hands of picked shots.

On the other hand, the long rifle has stood the severest tests on active service. The mounted infantry commanded so ably by Major Barrow in South Africa carried it, and, he informs me, experienced no difficulty, or even awkwardness, from the length of the weapon in mounting and dismounting. It was carried in the Namaqua buckets, so that the men were not injured as they are apt to be by a rifle slung over the shoulder. The bucket did not gall the horses' sides or produce sore backs.

In Egypt the long rifle was used with equally satisfactory results.

With reference to the way in which the rifle was carried in this and in the recent campaign in Afghanistan, Lord Melgund, who served with distinction in both, has given me some very interesting

information. In Egypt, he says, both the long and short Martini-Henry were carried without bucket or sling. The mounted infantry always carried them in the hand. I cannot conceive how in bad weather, or in a protracted campaign, such a system could be possible, and hope it will never be adopted for Yeomanry; the circumstances which rendered it practicable in Egypt must have been exceptional, and possibly the mounted infantry did not carry buckets because there were no buckets for them. In Afghanistan, the same Officer tells me, the carbine was carried as by our regular cavalry, in a bucket, but a great many carbines were lost from horses falling upon them before they could be disengaged. It was suggested that the men should, the moment they came under fire, draw their carbines; this would be awkward for regular cavalry, who may be called upon to charge at any moment, but for such troops as I am endeavouring to describe would seem to meet the difficulty.

But if the force is to have a new rifle, and this is the first step that must be taken if their efficiency is to be materially increased, let them have at once a repeating or magazine rifle. These must be the weapons of the future, and the army that is first supplied with them will have a tremendous advantage over its adversary. They are already used in the Swedish, French, and other navies, and, experimentally, in our own, and are being gradually introduced into continental armies. The theory that such weapons caused waste of ammunition has been disproved by practice; they proved of startling efficacy in the American War, and the Circassian cavalry, armed with the Winchester or Winchester-Henry carbine, performed some remarkable service in the Russo-Turkish campaign. If, however, the authorities will not entertain the question, perhaps the principle of the new point-blank rifle might be applied to the Martini-Henry carbine, or rifle, and issued to the Yeomanry.

The sword, if worn at all, should not be carried as at present. The Dragoon ought to be as active on foot as any rifleman, but no man can run with a sword, 40 inches long, and broad in proportion, now sticking in front, now catching behind, and lastly getting between his legs. Even when hooked up, the long slings are in the way and the sabretâche is simply a nuisance; the fastest runner in the country would be heavily handicapped if he had to run with a bunch of slings in one hand, a rifle in the other, and a sabretâche dangling against his legs. If Yeomanry are to fight effectively on foot, the sabretâche must be abolished; it is not wanted for any papers, as they can be carried with equal safety in the wallets. The sword ought to be attached to the saddle; if it is awkward to reach in the usual place let it be fixed on the near side, *in front of* the saddle, like a horn. This will doubtless look hideous, but it will be practical, and after all such things are merely matters of fashion: twenty years ago the tunic was considered an abomination.

The sword, however, is really of little use for Yeomanry; like the lance, it is a feeble weapon unless wielded with the utmost skill; the casualties caused by it in the Franco-German War were absurdly small; from a Return issued, in 1876, by the German medical staff it

appeared that of 65,160 killed and wounded on their side, only *six* were killed by the sword, 212 wounded, though something like 40,000 cavalry were engaged, and had some heavy fighting. The circumstances in which the sword was recently used in Egypt were quite exceptional.

A mounted man, however, must have some other weapon than his carbine; on service the Yeomanry should undoubtedly be armed with a rifle and revolver; the value of such equipment for such troops was proved in a thousand instances during the War of Secession, but unless the authorities can supply the whole force, the sword must be retained.

I would urge very strongly that in every troop of Yeomanry, four, or at least two men should be told off as pioneers; they should be equipped with Major Wallace's spade, which could hang on the near side behind the saddle. On service, in crossing the country, for making and filling up gaps, creating obstacles, &c., these men would be invaluable. The cost of the spade is about 6*s.*, the bucket about 7*s.*: this could be defrayed from regimental contingent funds.

Lastly, a couple or more of Morris's aiming tubes should be issued to the headquarters of every troop, and the men encouraged to purchase them for private practice.

Dress.—The question of dress must now be approached. There are no more handsome uniforms in the British army than in the Yeomanry Cavalry, and it is with a pang of regret that I suggest that many of them should be consigned to the limbo to which brass epaulettes, high stocks, monstrous headgears, and other relics of past tailordom have departed. The undress for foot parade, stable duty, &c., is, as a rule, neat and practical, and might well be retained by regiments—and, as a link with old times, Officers might retain their present mess dress—but, as a rule, the field day or review order of Yeomanry is quite inappropriate for mounted riflemen. I should like to see one uniform adopted for the whole force: the advantage of this would be very great if only for purposes of concentration. Some months ago, when it was proposed to assemble a representative regiment at Aldershot, an insuperable difficulty arose in the diversity of uniform which existed in the Yeomanry. For mounted duties they should have a low helmet, or short busby; a dark blue uniform, sufficiently loose at the arms and waist; dark breeches and "Field" boots; pouch and waist-belts of white leather—dark leather does not help to conceal a man, and always gives a dirty appearance. There should be no sword-belt; the ammunition should be carried as at present; the cartridge-belt worn by the irregulars in South Africa is not suitable for this variable climate. The pouch at present worn by Officers in both regular and auxiliary cavalry is useless: it will not even carry cigars satisfactorily; it should be replaced by a case for binoculars similar to those worn by the Staff, and should be carried not only by Officers, but by serjeant-majors and sergeants.

Whatever alteration may be made in the uniform of the force, care should be taken to render it attractive. Men cannot be expected to take any pride in themselves if they are clad in an ugly dress. The

Hussar tunic, or Horse Artillery jacket, already worn by some regiments, might be adopted.

The horse equipment must be as light, and yet as serviceable, as possible; for a combination of these qualities the present kit of the regular cavalry seems best.

I would point out that although it has always been said that unless you firmly exclude any cavalry element from mounted infantry, they will gradually affect cavalry ways and equipments, and insensibly relapse into inferior cavalry, the Yeomanry must not be subjected to this rule. From the days of the Commonwealth the Yeoman has served as a horse soldier, he joins the service now-a-days to be a horse soldier, he is fond of his horse and fond of riding; if he had wanted to be a foot soldier he might have joined the Volunteers he will tell you, and if any attempt is made to convert the force into foot soldiers it will evaporate. No, the Yeomanry must still remain in the category of horse soldiers, and if the term Mounted Rifles is considered synonymous with Mounted Infantry, let them, as already suggested, have the good old name, Dragoons. Still, some change must be made, and if the Yeoman is dressed, trained, and equipped less like the regular cavalry, and more upon the lines so feebly sketched out in this paper, he will become as valuable a unit of our military forces as the most enthusiastic among us can desire.

It only remains to be considered how these changes may be effected. The slight alterations in drill, the establishment of sections, &c., might be introduced by a stroke of the pen. The rifles should be issued by Government. The Wallace equipment and Morris aiming tubes should also be issued by Government, but paid for, where possible, by regimental contingent funds; and to ensure their being kept in a condition of efficiency, Inspecting Officers should be directed to report upon them annually. Regiments should be ordered to supply themselves from local sources with linking straps if approved.

The only change really necessary in uniform would be in the headdress, belts, and tunic of certain regiments. As a rule, regiments wear dark blue breeches and boots, and also white belts; but taking into consideration the necessary alterations, and cost of rifles, a uniform sum of 5*l.* a man would probably be required. Taking the force at a minimum of 10,000, this would amount to 50,000*l.*, which might be distributed over a period of five years by an annual addition to the Yeomanry estimates of 10,000*l.* Considering that for many years not a shilling has been added to the usual rate, and that the estimates for the Volunteers have year by year been increased by many thousands, the authorities ought not to grudge an expenditure which, though trifling in amount, would increase the value of the Yeomanry to a very considerable extent.

I trust I have shown that the Yeomanry may become an auxiliary force of very great value. It remains to be seen whether the authorities will make any attempt to produce this result; it will be urged, doubtless, that auxiliaries are never to be depended upon. I contend that the Yeomanry will form an exception to this rule, for even if acting against an enemy, they would never be subjected to the

heavy fire which auxiliary infantry, such as Militia or Volunteers, must be prepared to face, if they are to be relied on. I would add that, if ever this country were invaded, the weak establishment of our regular cavalry would render every man of the Yeomanry indispensable, even if the force were disarmed, for the performance of orderly and similar duties.

It would be a matter of regret should such a body of men be lost to the country, but if they are to be retained, the Government must at once show them some substantial encouragement. Depression in agriculture and trade has produced its natural effect in the ranks, and last year only some 9,000 men presented themselves for training. It is difficult to say in what form encouragement can be extended to Officers, for these are evil days for landlords, and in some districts a difficulty is felt in obtaining suitable men for the commissioned ranks. It was unreasonable to deprive the Yeomanry of their trumpeters, and to compel Officers to provide and to mount these most necessary men. It is equally unreasonable to expect Captains of troops to mount their permanent serjeants. Such expenses as these should be defrayed by Government, and where it can be shown that Commanding Officers are put to serious expense, in consequence of the insufficiency of the annual grant of 2*l.* per man, it should be increased to the original allowance of 3*l.* Commissions in the regular cavalry should be given, not as at present to Militia, but to Yeomanry subalterns.

The men of the force were formerly exempt from horse tax for one horse: strange to say, this exemption retained many men in the service who would otherwise have left it. In lieu of this, let Yeomen be exempt from serving upon juries. This would be a remarkably inexpensive method of attracting recruits, but would doubtless have a considerable effect in filling the ranks.

In considering the organization of such a body as the Yeomanry, it must first be determined whether it is to be regarded as an auxiliary force, a reserve, or as a force combining the nature of both. In the preceding remarks, I have treated the Yeomanry as a purely auxiliary body, being convinced that the existing constitution of the force debars it from being anything like a reserve to our regular army. The men come from a class that is never likely to furnish recruits, and the horses are their own property.

It is, however, indisputable that our regular cavalry are at present absolutely without reserves, and it is very desirable that the Yeomanry should, in some way or other, supply the deficiency. This, though, can never come to pass unless some radical changes are effected: such changes must cost money, and any proposition involving expenditure, even though aiming at the establishment of a cavalry reserve, will probably be dismissed without a thought.

In order to invest the Yeomanry with the nature of a reserve, a modification of the infantry depôt system might be adopted. The regular regiments, without in any way altering their existing numbers or designations, should be localized in districts, a certain proportion of Yeomanry regiments being told off to each. The cavalry reserve men should

be attached to the Yeomanry regiment of their native district. They should be clothed and equipped by the regiment with the aid of a special grant or allowance; they should be called out annually at the permanent duty, and, if necessary, for a certain period previous to the training, when they should be under the command of the Adjutant. As the Yeomanry are now subject to military law whenever under arms, there would be no difficulty in dealing with the men of the Reserve; but any special provisions for their discipline could easily be made.

A limited number of men should be allowed to join the Yeomanry without horses, but they should for a certain period be liable to be called upon to serve in the regular cavalry. In order that this should not be distasteful to the class ordinarily serving in the Yeomanry, no men should be attested unless bearing exceptionally good characters.

These men should be mounted by requisition. A certain number of horses should be selected annually and registered, their owners guaranteeing, for a certain consideration, to produce them for duty whenever required; these horses should be annually inspected and reported upon by the Inspecting Officer at permanent duty.

To induce farmers to fall in with this idea of requisitions, some *quid pro quo* must be offered by the Government. To make any suggestion on the subject seems a waste of words, but I should like to see a well-bred entire horse, with plenty of bone and substance, kept at each of the miniature depôts I am about to describe; these horses should be occasionally transferred to different counties, and should serve gratis a certain number of mares likely to breed cavalry horses. The owners of these mares would of course own the produce, but would be liable to have one or two colts registered as described already, or even purchased at a reasonable price by Government. This would be a very different thing to the risk and expense of keeping a number of mares, and would entail no additional staff. It would, to some extent, mitigate the serious falling off in the quantity and quality of horses at present in the country, which is beginning to constitute an obstacle to the maintenance of the Yeomanry, and the effects of which must ere long be felt by our regular cavalry.

Small barracks, containing Adjutant's quarters, stabling for about twenty horses, a riding-school, quarters for thirty or forty men, orderly-room, &c., should be built at the headquarters of Yeomanry regiments. The staff should consist of the Adjutant, relieved when necessary by a qualified Yeomanry Officer, and assisted by a regimental serjeant-major and assistant riding-master, as well as recruit regular or Yeomanry Officers. At these barracks all recruits and remounts for the regular regiment of the district should be trained, the Yeomanry and Reserve horses coming up for training as required, remounts being purchased as far as possible in the district, and by the depôt staff, the Yeomanry veterinary surgeons being employed when necessary.

The advantages of such a system would be an immense saving of time to the staff of regular regiments in training recruit men and horses; a great saving of expense when the preliminary cost of

barracks, &c., was absorbed; an extension of the territorial system to the cavalry, without all the drawbacks and heartburnings which that system has evoked in the infantry; the organization of a regimental reserve, and the formation of a bond of union between the regular and auxiliary cavalry which would prove an advantage to both.

The consideration, however, of such changes as the above would entail, should not interfere with the suggestions which have been made as to the Yeomanry proper; if converted from merely an auxiliary force into an auxiliary and reserve, it must not be forgotten that their qualities and energies will be wasted unless they are trained and equipped as Dragoons or Mounted Rifles. Such drill will not make the Reserve men who may be distributed amongst them one whit the less fit to take their places in their old regiments; it will rather sharpen their wits, and help to counteract the evils of a relapse into civilian existence.

The CHAIRMAN: I am sorry to see so small an audience to listen to such a very interesting lecture. I hope that, though the number here is but few, there are some Officers present who will enter into the discussion which should always follow the lectures in this Institution, and will give us the advantage of their views on the subject.

Colonel MUSSENDEN, Inspecting Officer for Auxiliary Cavalry, Aldershot: I am sure we all endorse what the Chairman has said as to the very great interest of the paper which Major Edwards has read to us. I may say from my knowledge of Major Edwards that he is one of the most zealous Yeomen that we possess in the force, and he has also, not only in the North of England but in my district, had very great experience, from personal observation, of the merits of the Yeomanry, and is therefore very well qualified to give us this lecture. There has been a good deal in the paper that he has read to us in which I entirely agree, though some points which he has raised may be open to discussion. He has very properly told us that cavalry duties are to be divided into two parts: the actual attack, and the detached duties of cavalry. Now, as regards the actual attack, he tells us that Yeomanry are unfit for such duties, that they are unfit to take part in the shock of cavalry. I must say that I think he is rather hard upon his branch of the Service in saying this. I have been told that when the Yeomanry have been called out in aid of the civil power, along with the regular cavalry, on many occasions the mob seemed to care little for the regular cavalry, but they bolted as soon as the Yeomanry were let loose: the reason being that there was very great difficulty in stopping the Yeomanry when they were once set in motion. They rode over everything, and were really most effective. I do not know how far that would hold water in the case of European warfare, but from what I know of the Yeomanry I think that they can make a very effective attack in line. I quite agree that more attention should be paid to detached duties, outpost duties, reconnoitring, scouting, and so on, and I think the Yeomanry are admirably adapted for these particular duties. They are an intelligent race of men, they ride well, and know the country. The main question, however, comes to this: is the Yeomanry of the future to be composed of auxiliary cavalry, or is it to be composed of mounted infantry? I think there is no medium between cavalry and mounted infantry. If you give the Yeomanry the long rifle you ought also to give them the Elcho bayonet, or some weapon with which they can fight their enemy on foot when their ammunition is exhausted. If you give them the long rifle, it is essential that the sword should be removed altogether, and that the Yeoman should no longer depend upon his sword. Being armed with the long rifle and the Elcho bayonet, he would still be available for many of the detached duties of cavalry, scouting and so on; but no body of mounted infantry should ever be detached without having a strong cavalry support at hand. No doubt the mounted infantry in Egypt did admirable service, but they

were not opposed by very formidable cavalry. Had they been, I do not think they could have gone quite as far ahead, and have left their horses as they did. I consider the *rôle* of the mounted infantry is rapid transport from place to place, seizing and holding positions, bridges, defiles, &c., but on all occasions trusting solely to the rifle and the bayonet. As at present constituted the Yeomanry has attained a certain degree of efficiency as auxiliary cavalry, and it must be remembered that the 14,000 Yeomanry that we have at present represent the whole of the volunteer cavalry for a force of volunteer infantry amounting to some 200,000 men; and surely this is not too large a proportion of cavalry. The Yeomen proper—the farmers of England—are good horsemen from their childhood, able not only to ride across country but to train their own young horses in a very short time. If it were not for that, they would be able to do very little in the few days' training allowed them in the year. I think it would astonish many cavalry Officers to know what a very large proportion of three-year-olds are brought out for training—horses that really have not been backed half-a-dozen times before they are put into the ranks; but the men are able, from their good horsemanship, very speedily to get these animals into shape. I would not believe that such was the case until I had looked at some of the horses' mouths, and found that many of the horses were three-year-olds, while some were only rising three. I am afraid the shooting of the Yeomanry is not good—my experience being that good shots are the exception, not the rule. Much attention is now being paid to the subject, and I hope the shooting may improve, but at present I am afraid it cannot even be called indifferent,—the shooting of the Yeomanry, I should say, is bad. Some regiments pay more attention to it than others, and shoot fairly well; but the shooting of the Yeomanry, generally, is, no doubt, its weak point. I consider, for that reason if for no other, that the Yeoman proper is better adapted to fight on horseback than he is on foot. Of course Yeomen who are not tenant farmers, and who live in the neighbourhood of large towns, have advantages with regard to shooting which may render them as good shots as the Volunteers; but those men have not the cavalry qualities of the Yeomen proper—I mean the agricultural portion of the force. One troop of the Middlesex Yeomanry is about to be armed with the long rifle and the mounted infantry equipment, as an experiment. We shall all watch this experiment with great interest, and if it succeeds I have no doubt that other Yeomanry corps will ask for a portion, at least, of their regiments to be armed with the long rifle. I have already had one or two applications for long rifles from regiments in my district; but I have told them it would be better to wait to see the result of the experiment in the Middlesex Yeomanry. Now about the Cavalry Reserve. I regret that there should be any need to enter into the question of how the Cavalry Reserve and the auxiliary cavalry might be brought together for mutual benefit. The cavalry service is now limited to seven years, and at about the age of twenty-five a soldier is relegated to civil life—surely very much to the loss of his regiment; and what is the gain as regards the formation of an effective Cavalry Reserve? Have we any reserve cavalry horses, or how can we form a reserve of cavalry horses? Cavalrymen, as a rule, are not enlisted, as are the Yeomanry, from the riding class, and when they go back to civil life most of them are entirely separated from horses and from stable duties. In two or three years they become as helpless as a recruit, with the addition of the stiffness which so surely follows advancing years; and it is much more difficult to make an efficient cavalry soldier of the reserve man who has been two or three years away from his regiment than it would be to make an effective cavalry soldier of (say) a London sharp boy that you pick up at the age of eighteen. It is very different to the case of the Infantry Reserve man, who goes away from his regiment, but does not of course lose the power of walking about and marching when he goes into civil life; he comes back, soon picks up his drill, and becomes the backbone of his regiment. I cannot say how it would work in the Cavalry, but supposing we were to try to amalgamate the Cavalry Reserve and the Yeomanry, I am afraid there would be a great many difficulties in the way. In the first place, I can only see one way of doing it, and that is by providing horses from the nearest cavalry regiment for the use of the reserve men. Now, if Yeomanry were scattered all over the country with the Cavalry pretty equally, something of that sort might be done; but take the Southern District, for instance: that district contains three Yeomanry

regiments, but it has not a single Cavalry regiment quartered in the command. The Western District is still worse, for there are eight Yeomanry regiments, and not even a cavalry barrack in the command. It would be very difficult, I think, to provide horses for the reserve men in those two districts. It could only be done by sending them from Aldershot, and, probably, Commanding Officers would very strongly object to lending their horses to unknown riders. But even the reserve men themselves would be very unevenly distributed. In some counties the reserve men might be counted on the fingers of both hands, but the Cavalry Reserve in London alone would amount to some couple of hundred men, more or less, and increasing every year. If those men were called up for a week's training with the Middlesex Yeomanry, it would become a question how they were to be mounted. I should doubt very much if the Commanding Officers of the Household Cavalry would not very strongly protest against sending a couple of hundred of their black horses to mount the reserve men; and even supposing you could get the horses for them, I am very much afraid the two classes would not amalgamate very well during the training. In the first place, the reserve men are not as well off as the Yeomanry, and especially as the Middlesex Yeomanry, and if they were called out, billets would have to be drawn for them, and, in whatever town they were called out, the fact of drawing billets would make the Yeomanry very unpopular. I do not think publicans like putting up soldiers on the march, even for a single night: in the North of England they very strongly object to it; but they would certainly not like to have to put the reserve men up for a whole week. Many Yeomanry Officers have told me that the ordinary expense that a Yeoman is put to for his training amounts to as much as 5*l*., in addition to the 7*s*. a-day which he gets as his pay. I have no doubt whatever that a very great hole is made in a 5*l*. note by the week's training. The lecturer made several suggestions. One was about dismounted service—the advisability of dismounting a larger number of men. I think we may fairly divide the dismounted service into two heads: temporary duty—when you would merely dismount one-half of the men, as laid down in the Cavalry Regulations; and the more permanent dismounted duty, when you would dismount your whole troop or squadron, and link the horses in the ordinary way. I am afraid the system of linking the horses by the mouth would not be found to answer; the horse's mouth is very sensitive, and I would prefer Major Bower's plan of fastening the thong to the collar-ring. As regards working in single rank, I think there is no objection at all to regiments working in that way,—in fact, all the weak regiments do work in single rank. I am glad to say we have got some strong regiments still left in the Yeomanry, and I think, if they worked in single rank, one man's voice would hardly be of sufficient power to reach the whole of the squadron. As a matter of fact, a great many regiments do work very well in single rank. As regards uniformity of equipment, I should rather deprecate any general alteration of the uniform, and for this reason, that any change of uniform would fall not upon the public but upon the funds of the regiment, and some of the regiments are not so flourishing in their funds that they could afford a new equipment. If we were forming a new regiment I should strongly advise some sort of uniform like that now worn by the East Kent Yeomanry (Mounted Rifles), which is a most workmanlike and soldierlike dress. It is very much like the uniform of the 60th Rifles, or what used to be called the 60th Rifles. I am afraid I have trespassed too much upon your time. I will only say, in conclusion, that I am a great believer in the Yeomanry; I think they have gallantly struggled to keep their heads above water during four or five years of very great agricultural depression, and if anything could be done to encourage them, or to make the public believe that the Yeomanry of England is a valuable addition to Her Majesty's Forces, it would afford me, personally, the very greatest satisfaction.

Major ACLAND, M.P.: I perhaps ought to apologize for addressing this meeting, seeing, as I do, before me so many men of much more knowledge and experience than myself. But on this particular subject I hope I may claim, as both a Volunteer and Yeoman, to have had some slight experience in a purely amateur way. I have been in a Yeomanry regiment for fifteen years, and before joining the regiment I had command of a Mounted Rifle Volunteer corps, raised by my father, of which I retained the command for fifteen years, holding the double command under a special

provision—which I daresay the Inspector is aware of—that used to be in the Regulations for the purpose. That Volunteer Rifle Corps was equipped almost precisely in the manner in which Major Edwards proposed that the Yeomanry should be equipped for the future. We carried long rifles, for ten years, in Namaqua buckets. The men used to go over fences at a smart pace; they came up to Wimbledon, and were never lower than third in the competition for the Loyd-Lindsay prize for four or five years. They were second two or three times, and third once or twice; being, several of them, very good shots indeed. The principle of their training was different from that of the Yeomanry. The Yeomanry go out for eight days' permanent duty. The Mounted Rifle Volunteer Corps of Devonshire, of which there were five at one time, used to go out about a dozen or fifteen times a year, for two or three hours' drill in the afternoon. It was perfectly easy for them to ride away after their dinners, and get home again to their teas without any one missing them. And we were able in that way to keep together thirty or forty men as a Volunteer Corps. When the Yeomen who had learned their drill in the Yeomanry got too old, or were married, or perhaps lost their father or brother,—whoever was helping them on the farm during the time that they were out for their eight days' duty,—when they lost that helper they used to leave the troops, and come into the Mounted Volunteer Corps, because, although they could not afford to be away from their farms for eight days at a time, they could easily ride away from their farms for two or three hours in the afternoon, and get their two or three hours' drill, a dozen or twenty times a year. Colonel Oakes inspected us on many occasions, and if he were living now, I think he would willingly testify that that corps was just as smart as any Yeomanry troop that he would wish to see; in fact, he said so over and over again. I believe he used to say the same of Colonel Bower's corps which was enrolled a week before the corps I had the honour to command, and was disbanded about six weeks before mine, so that I believe the one I had was the last Volunteer Corps in England of that description. I have said this in order to show that it will not be the first experiment in carrying long rifles that is about to be made by the Middlesex troop of Yeomanry. We carried them successfully for ten or fifteen years, and found it perfectly easy to cross country with them, or to do anything else. There is this advantage about the Namaqua bucket—that a man may gallop up, and during the last 3 or 4 yards of his gallop he undoes the loop, and as he dismounts he pulls the rifle over the near side with him without the slightest difficulty—even more easily than with the ordinary cavalry bucket.

Colonel MUSSENDEN: Had you the sword?

Major ACLAND: We used to carry swords; we had the bayonet at first. The sword in one of the Volunteer Corps was carried with a flat hook, which was hooked on to the belt. Below the hook, as part of the same piece of iron, there was a ring, and when the thing was unhooked, as it could be by a single motion, it enabled the sword to be hung on to the front of the saddle, and there it was perfectly safe, and the man could run about free without his sword. That was the great difficulty we had to solve—how to get the sword attached to the saddle. That was tried for a certain time, but we did not carry it very much into effect. As a rule we kept the swords on the men, because we found it, on the whole, easier to adapt the drill which Colonel Bower's volunteer rifle drill embodied, of extending to considerable distances in sections of four and dismounting half of each section, never taking them more than 10 or 15 yards from their horses, and closing again mounted. It was more easy in that way to cover a large extent of country. You could cover two or three sides of a field, or get through a wood, more quickly in twos or fours than in larger bodies of men. But we also used to have a drill very much analogous to the present double rank cavalry drill—but which we always practised in single rank only. We found it perfectly easy to work two or three corps together. The Inspector made one or two remarks which I hardly like to criticize, but at the same time, as I have an opinion upon them, derived from fifteen years' experience in the two particular branches, I venture to suggest one or two points in which we do not agree. I cannot sanction the statement that the Yeomanry men, in the regiments that I know, spend anything like 5*l.* when they come up for their eight days' training. I do not think that they do in most regiments, although I know some are much more expensive than others. It depends to a large extent on the habits of the men.

Colonel MUSSENDEN: I only judge by what I have been told.

Major ACLAND: If I could not tell my friends among the farmers that their sons would not have to spend any more than a pound or so beyond their pay, I am afraid very often I should not get them; and as I do get them, and, what is more, keep them, I gather from that that they do not cost their fathers more than a couple of pounds at the outside. The exemption from the horse-tax, which used to save a man only 10*s.*, was, I always found, quite enough to get a farmer to send his son into the Yeomanry. There is one other point about the sword. I quite agree in the difficulty of teaching Yeomen to use their swords; I believe it would be almost impossible to teach Yeomen to use their swords efficiently; but at the same time, if we are to have any large section of the body dismounted, and if they are to have a support, would the support be of any use without swords?

Colonel MUSSENDEN: No; I said a cavalry support.

Major ACLAND: A cavalry support would have to be a regular cavalry support, or it would entail teaching the auxiliary men the use of the sword: that is all that I mean. Some part of the regiment would require to have swords. With regard to the outpost duty, I have found it of the greatest possible interest to the men; and our constant practice has been to get squadrons together, even sometimes for a couple of days' drill, at 20 miles' distance, and to get them to reconnoitre against one another; and I think, on one or two occasions, those who were first discovered had to pay for the luncheon of the other men: at any rate, it made them exceedingly keen in their work. I want to make two practical suggestions, because I hope that Major Edwards will take care that this most valuable paper of his comes before the authorities. One is this: one of our great difficulties is to get the men who have been in the regiment for four or five years to come up to the extra drills. They are men of business, and the Yeoman gets no pay whatever for his extra drills. He gets his 7*s.* a day for the eight days' permanent duty, and he is expected to come to a certain number of drills besides. The Government seem to have forgotten that the Volunteers come for their drills almost as an amusement, and at no expense to themselves, beyond shoe-leather; but the Yeoman cannot come up to mounted drill without taking both himself and his horse away from his business. The horse is worth at least 7*s.* a day to him on his farm, besides the superintendence that almost all men who compose Yeomanry regiments have to give to the practical work of their farms. They have to ride away 10 or 15 miles, and to give the whole day to their drill. Practically they are put to an expense which, at the minimum, is 7*s.* a man. Now I should be glad if we could persuade the Government that it would be a great inducement, and worth doing if they wish the Yeomanry to be of any service, if they would give us, instead of eight days' pay for permanent duty, of which in several regiments one day is taken up in marching in, and another in marching out,—if they would give us half-a-day's pay for each of those days, and give the whole day's pay thus saved to the extra drills, *i.e.*, give 2*s.* 6*d.* for each extra drill; for you require three extra drills from every Yeoman. But of course I should very much prefer if you would give us an *extra* day's pay in that way.

Colonel MUSSENDEN: Ten days' pay?

Major ACLAND: I do not think it would quite answer to give ten days' pay—for this reason: there are very few men who can afford to be away from their business for ten days; eight days is the outside, and many of them want a day's leave out of that; but there is this that can be done—and I think it has been done in one regiment—that when a man has been in the regiment for three years, and has been passed by the Adjutant as an efficient man, he should be allowed not to come into quarters until the third or fourth day of permanent duty. Because the result of the present system is, that you have on the first day of permanent duty, say twenty per cent. of your troop's recruits; whereas, if you had the recruits out by themselves for two or three days, you could teach them all the elements of squadron drill—to move about, increase and diminish front, and to know what wheeling is, and riding, and so forth. And then by the time the old soldiers were coming into quarters you would be able to get the regiment together in an hour instead of taking a couple of days about it, as at present.

Colonel MUSSENDEN: Then they would have only four days' pay.

Major ACLAND: I should like them to have the other day's pay for extra drills,

because they are most valuable at separate troop drills, in helping the young soldiers to get into their places. There is another suggestion which Major Edwards has made in his paper. I do not know whether he ever heard Colonel Oakes speak about it, but I remember Colonel Oakes saying to me, many times, that if ever I had the honour of getting into Parliament, he hoped I would keep it continually before the authorities. The suggestion that I refer to is in the last paragraph but two or three. I may say, I have made the suggestion to Lord Hartington, and he listened with considerable interest, and begged that I would remind him of it when the proper time came; so that the additional authority given to it by Major Edwards's spontaneous suggestion will, I hope, not be lost—that is, as to the establishment of breeding *depôts* all over the country. There is only one other thing I wish to mention, and that is to express my sense of the great importance that I think all Yeomanry Officers, who have experience, attach to the instruction at Aldershot. Nothing has been more valuable to the Yeomanry service than the establishment of that Aldershot school. I do trust that the authorities will maintain strictly the obligation of all Officers to go through that school, if it is only for a fortnight or three weeks. The elementary and skilled instruction given there gives the Officers confidence in themselves, which afterwards gives their men confidence in them; and if the authorities would carefully peruse the suggestions of Major Edwards, and would take the Yeomanry in hand, and make them feel that they want them to be of some use, I am quite certain that they would answer to the call.

Lieutenant-General Sir EDWARD HAMLEY, K.C.B.: Before having the slightest idea as to what course the lecturer would take, I devoted a short time to-day to the consideration of this subject, and—I say it with all diffidence and modesty, because I am not a cavalry Officer—the line of argument that he has followed has, to my great gratification, been such as had suggested itself to myself. We have in the Yeomanry a large body of men who, with intelligence, spirit, and zeal, are only asking how these qualities can best be turned to the service of the country. Major Edwards has told us that, I think, in the most effectual way. I do not propose to enter into the details which he has so copiously given us, and which have been so completely discussed by other Officers; I will only say that I quite concur with Colonel Mussenden in thinking that there is no medium between cavalry and mounted infantry, and that any attempt to produce a force between the two would only be to muddle and spoil both. On the other hand, I quite concur with Major Edwards in thinking that the best use you can possibly make with the Yeomanry is probably to form them into mounted infantry. I will not go any further into details, but only express my general concurrence in Major Edwards's views. I think it is very fortunate that the idea that he has given us should have come from within the force rather than without. I think it is a matter of great promise for the Yeomanry that an Officer who has evidently given so much attention to the subject as Major Edwards, and with such excellent results, and who is capable of expressing his ideas in so clear a manner, should give us the benefit of his views. It is a step in the right direction, for in case of invasion a large force of Yeomanry would be at the disposal of the Government, and it is most important to consider how it could be turned to the best account.

Major HELYAR, 3rd Hussars, Adjutant West Somersetshire Yeomanry: I wish to say a word with regard to the shooting of the Yeomanry. At present we have thirty rounds given us per man, and I think that if the authorities would only increase that to forty or fifty it would be a very great advantage. In my own regiment last year we bought 10,000 rounds more than the amount actually supplied by the authorities, and this year we have already bought in 5,000 rounds. I think an increased allowance of ammunition would assist in making the men better shots. I would also suggest that Yeomanry non-commissioned officers should be permitted to go to the school at Aldershot; if this encouragement were given them, and if they went under some system whereby they had a certain amount of the expenses paid them while they were there, you would find a great many of them would go. I should like also to see the permanent staff go to Aldershot, or to some other cavalry centre, either every year or every two years: for then I am sure the Adjutant would have a much easier task in

keeping them up to their work and preventing them getting into slovenly habits. I go further than Major Acland, and say not only would I pay them two shillings and sixpence for each troop drill, but I would ask the Government to give each man who turned up at troop drill his day's pay just the same as if he were on permanent duty. I should also like to see the permanent drill lengthened by two or three days if we could have it. I do not think the suggestion with regard to the men being let off the first two or three days would work very well. I should also like to see the Yeomanry supplied with equitation articles, such as single-sticks, masks, and tent-pegging spears, so as to help them becoming good horsemen and cavalrymen. I should also like to see troops of Yeomanry regiments encouraged to go to the drills at Aldershot; I am sure we could get up a certain number of men from every regiment if we only had a certain amount of assistance given us. With regard to what has been said as to the Yeomanry not learning sword exercise, I think if Officers could go to North Somerset they would see a regiment that will go through its sword exercise almost as well as any cavalry regiment they have ever seen.

Captain BICKERSTETH, Middlesex Yeomanry: I wish to say a few words on one or two points. I thoroughly agree with a great deal of what has been said about the importance of teaching the Yeomanry shooting, but I am rather afraid of the term "Mounted Infantry." I much prefer the word "Dragoons." From the little experience I have had in connection with a regiment in the midland counties for some years, I am quite sure the Yeomanry so thoroughly look upon themselves as cavalry that I doubt whether you would find the same class join the ranks if they thought they were joining as mounted infantry; they are a class particularly open to the influence of sentiment: even the removal of the exemption from the horse-tax had a very great and damaging effect upon our recruiting, and I think any proposal which made people believe that the Yeomanry were going to be turned into mounted infantry might be equally injurious. Out of a nominal force of 14,000 Yeomen it appears that last year there were only 9,000 actually out for training. It has been exceedingly difficult for the last few years to keep troops up to their proper strength, and we should be very careful how we introduce any change which would frighten our troopers, or make them think that they are not going to be regarded as cavalry. There is another point which struck me as I listened to Major Edwards's interesting lecture. The mounted infantry in Egypt were picked shots, and perhaps it would not be possible in a regiment of Yeomanry to get the figure of merit anything like as high as it ought to be if they are to be relied upon as mounted infantry. The idea of having a troop formed of the best marksmen or the best shots of each regiment as mounted infantry, or having a certain number of men in each troop told off as marksmen and equipped with the long rifle and Namaqua bucket, might, I think, be worthy of consideration; but if you were to turn whole regiments of Yeomanry into mounted infantry, and to rest in the belief that the country was well provided with that branch of the Service, I think that you might find in time of need that you were leaning on a broken reed. With reference to a longer period of training I used to find that the men in my troop came from very long distances; they were nearly all farmers, and they would not in the least have objected to a longer training, say for even fifteen days, if they could be sure of getting two days' leave in the course of the training. What they felt was that when they were more than a whole week away from their farms they could not know how things were going on. During the eight days the men were continually coming to ask for leave for one day to go back and see how their farms were faring: but if they could pay two unexpected visits to their homes during the training, they would not mind being out for a fortnight. Again, I was frequently told that if the Government would give them some little encouragement it would be a great inducement for men to join. They often mentioned exemptions from service on juries as a privilege which they said would almost be the same thing as the exemption from the horse-tax. It is not so much the actual value of an exemption, because to a great many of the Yeomanry the pay is really a small matter, but they like being recognized by the Government. As I have already said, Yeomanry are a sentimental class, and if we could get some little privilege of this sort, I think the Government would find it quite worth their while to grant it. There is one other point with regard to the Yeomanry upon which I feel strongly, and it is a matter that I think the Officers of Yeomanry regi-

ments have very much in their own hands. Constantly, when trying to get recruits, it has been thrown in my teeth—"Yes, but it is such an enormous expense." It is not only so in the regiments in the South of England, but in my former regiment I know that the Yeomen were put to very great expense beyond their pay, much more than 1*l.* or 2*l.*—I should say nearer 5*l.* for the week. Men do not like to join a regiment unless they can live as their comrades live, and I think the majority of Yeomen would be glad if, without loss of credit amongst their comrades, they could live more cheaply during the training.

Colonel MARSLAND, late 5th Dragoon Guards: It has afforded me great pleasure to hear this admirable lecture. I have always taken very great interest in the Yeomanry, and have thought that, if they were only properly instructed and looked after, they would be one of the most useful forces in England. Major Edwards says: "Every regiment may be depended upon to furnish guides for any part of its district." I am very glad to hear it, as I have always thought that was one of the chief uses that the Yeomanry might be put to,—that if a force were marching through England, the General would call upon the Yeomanry Officers to supply guides for the different districts. Major Edwards also said that every man could write and read, a matter of no small importance for reconnoitring—"a fair proportion can read and understand a map." I quite agree that the non-commissioned officers should be instructed how to reconnoitre: they should attend the classes, and in addition to that, after they have been instructed, they should collect their men together during the winter months and explain about the reconnoitring—not only how to reconnoitre but how to report. A great number of men are very fond of saying, "We have seen the enemy," but they cannot enter into details, and so the information they bring back is simply useless. A great number of them will ride several miles without being able to tell the General that they have crossed a bridge, or that there was a river, or that the country was enclosed. I think men, during the winter months, should be instructed in this important duty. With regard to carrying the rifle, I think myself every dragoon should be armed with a rifle with a sling attached to it. The rifle and sling should be carried on all ordinary occasions in a bucket as at present, and previous to the Dragoons coming into action the word of command should be "Sling arms! draw swords!" If a man's horse is shot, the carbine or rifle and any ammunition is not then separated. With regard to Major Edwards's plan for the linking of horses for dismounted service, I think too much importance cannot be attached to dismounted service with cavalry, and as to the fastening not being strong enough, we all know from experience that cavalry horses, after a few days' service, require very little to hold them. I think it is a most admirable suggestion, and should like to see it carried out.

Sir THOMAS ACLAND, Bart., M.P.: May I be allowed to say one word only on a main point of principle? I have listened with the greatest interest to this debate, and feel very proud to see my friend Major Edwards placed in so honourable a position as that of having given a lecture to-day, and having received so many compliments from military men for the quality of that lecture. But I confess I feel a little discouraged by what I have heard. We are told plainly, by high military authorities, that you must either have cavalry or mounted infantry. I have heard a little of what happened in Egypt from one of the noble soldiers who commanded there, and I am afraid that is true. Well now, if that is true, much as we admire the ability and skill and tact of the Major's lecture, what can we do in the direction he points out? He is asking the country to convert the Yeomanry into a Mounted Rifle force. He is told on high authority that it must either be infantry, or it must remain as cavalry. Now the principle which seems to me to stand in the way (and I venture to lay it before you as military men, who understand these things far better than we civilians can) is that these old-established auxiliary forces (the Mounted Rifle Volunteers were an exception under special influences) will not bear to be put upon any special ground, and they will only endeavour to follow and imitate the army. If you have in the regular army a body of mounted riflemen, not merely in name but in fact, either dragoons or carbineers, no doubt you can get the Yeomanry to follow them: you can tell the Yeomanry, "There is your pivot, you must form upon those men;" but I do not think you will get the present Yeomanry Cavalry regiments to consent to be

converted into anything which is not in the army. I was recently talking to a very experienced old civilian country gentleman, a Colonel of Volunteers and field Officer of Yeomanry, and he said, "There is another fact involved in this question, that if you do not follow the lines of the cavalry, all your drill instructors and your serjeants will be up against you directly; they will try to follow the routine they have been used to, and it is extremely difficult to get them out of it." That is the main principle which I venture to submit to this meeting. I feel very grateful to you for having taken up our subject. I do hope some day military men will be able to induce the War Office to give us something like a training school for educating drill instructors, and teaching them how to teach.

The CHAIRMAN: You must work that in the House of Commons.

Sir THOMAS ACLAND: I have worked it there; but I am getting too old now. As you are so kind, I will say one word more about Mounted Rifle Volunteers. You have heard the experience of a younger member of my family. For fifteen years we kept our Mounted Rifle Corps; we had five or six of these corps in Devonshire, and kept them together in spite of discouragement from headquarters. I am bound to say General McMurdo took great interest in them, but he made us carry swords. These men found their own clothes and saddlery; the whole thing was worked most economically, even to the extent of our little arrangements for feeding when we went out. The Government, however, would not give us more than the exact sum given for ordinary infantry volunteers, and this is what broke us down at last. We could have managed to pay our way no doubt: it was not the money that stopped us; but there was so much discouragement implied in the refusal to recognize the expenses of mounted men and horses. At last, Colonel Oakes, who devoted himself to the improvement of the Yeomanry, said, "I cannot come down here to be bothered to inspect twenty or thirty men."[1] In short, the whole thing was snuffed out from headquarters. We showed, however, for fifteen years that it was possible to get a number of farmers together, dressed in plain grey jackets, corduroys, and boots, who could ride and shoot well. That could be done yet, with proper encouragement; but I do not think you will get the Yeomanry to consent to being turned into mounted infantry.

Captain PHILIPPS, Pembroke Yeomanry: I belong to a regiment in South Wales where our men are widely separated, and I think, inasmuch as troop drills seem to be considered a very essential and important part of our duty, every encouragement should be given to enable us to carry them out efficiently. We had a meeting of Officers the other day, and considered the matter very carefully and anxiously, and the only practical plan we could suggest was (if possible) to get our men together for two days running; but in order to do that we should have to stop at the rendezvous for the night, and it seems to me that if the Government would allow some 3*s.* or 4*s.* a man for the drill it would be a great assistance when urging attendance. The men do not care so much for the actual money they receive as for not being put to expense; and I always find a Yeoman does not object to giving his time, but does not see why he should pay for his horse as well. As to the shooting, we have tried our best to improve it by giving prizes. We find this has made it very popular, and the men are very happy and willing (when they can get even a sweepstake prize amongst themselves) to spend two or three days from morning to evening at shooting practice. I think if the Government were not stingy in these little matters, such as giving us one day's pay for our troop drills and as much ammunition as we can properly use, it would be a very great help in keeping our force together. Above all what we want is some recognition. It has been a very great blow to us to have the horse duty done away with. There was a sort of "swagger" in a man's feeling that he was in a better position than his neighbour, and I really

[1] I think it was a fatal mistake when the Mounted Rifles were detached from the administrative battalions of Rifle Volunteers. As long as I commanded Rifle Volunteers, whether as a Brigadier or regimental Colonel, the companies of Mounted Rifles attached were of the greatest value on all occasions of assembly, both as to transport and in combining and communicating with different bodies. As soon as they were placed under cavalry inspectors, I felt that their doom was sealed.—T. D. A.

think if some such recognition in some other form could be given it would tend very much to increase the popularity of the force. For instance, if every man who was efficient were allowed to keep a pair-wheeled trap free of duty it would be asking the Government for very little more than the horse duty; *but* it would be giving the men a very great "swagger" over their friends and neighbours. I think if a man could drive about in a pair-wheeled trap, and say, "I pay no duty for this," a great many would join the corps. I have studied the Yeomanry considerably, and the few remarks I have made have been based upon the result of that study.

Lieutenant-Colonel HARFIELD, Middlesex Yeomanry: I wish to make one remark with regard to the course I have adopted, namely, that of having applied to the War Office for permission to arm a portion of my regiment with the long rifle. It seemed to me that there was no more practical difficulty in carrying the long rifle when mounted than the carbine, and on *that* ground I made my application—not for the purpose of converting the regiment into "mounted infantry" (which I think is a term which, at present at any rate, would be very unpopular amongst Yeomen), but rather to increase the efficiency of our "dismounted service." Whether the change will be popular in the regiments or not will be seen after our next training; but at present it is only an experiment. I think also it would be unpopular amongst the men if the sword was given up for the bayonet; but on this point I shall be glad to know what Major Edwards proposes. For my own part I am inclined to think that for the Yeomanry, when at close quarters, the revolver is the best weapon.

The CHAIRMAN: I have had rather a shock to-day. I have heard something about sword exercise in the Yeomanry, who have yearly three or four days' troop training, and eight days' permanent duty. Is it a positive fact that you go through that antiquated farce at your inspections?

Lieutenant-Colonel HARFIELD: I am afraid we do.

The CHAIRMAN: I served for twelve years in connection with the Prussian army, and saw it through two campaigns, and I think I saw every cavalry regiment in the service inspected more or less, but I never saw any sword exercise performed. I was surprised to hear that such a thing existed. I have not seen much of our cavalry since I came home, and therefore I may be supposed to be in ignorance of that fact. I shall not make any remarks upon the lecture, because I think our time has been stretched to the utmost period for which a small audience could be expected to remain. I will only, therefore, express my personal opinion that it is one of the best lectures that we have heard in this theatre. It has been admirably put together, and, whether we agree with all Major Edwards's proposals or not, it has embodied a very large amount of excellent suggestion. As I do not intend to say more myself, I am going to put myself into the place of a better man. I had a letter, half-an-hour before I came down here, from an old and esteemed friend—Colonel Bower[1]—the mention of whose name is quite enough to justify me in reading his letter to the meeting. He says,—

"Dear Sir Beauchamp,—I have this morning received a copy of the lecture on Yeomanry, which Major Edwards is to give to-morrow. I have read the paper with great interest, and much regret that I shall not be able to attend as a listener, and perhaps have been permitted to offer the lecturer my congratulations on the clear and practical views he holds on a subject which you and I know have long been regarded as of very great importance. I see that Major Edwards and I quite agree as to the necessity of Mounted Riflemen being a cavalry and not an infantry force; and I do most cordially hope that he may succeed in his endeavour to convert the Yeomanry from imitation troopers into useful dragoons, or whatever it may please the powers to call them. The lecturer's remarks on tactics, equipments, drill, &c., are so completely in accordance with the system which was introduced by me three and twenty years ago, as to re-kindle my hopes of yet seeing the desired conversion of the Yeomanry become a reality. I do not agree with Major Edwards's proposal to attach the sword to the saddle. I can quite imagine the inconvenience of a sword dangling between a man's legs in running, with a bunch of slings in

[1] 1st Hants Mounted Rifle Volunteers.

one hand and a rifle in the other, to say nothing of the *sabretâche* tripping up the runner; but all these troubles are easily avoided by carrying the sword in a frog, as we used to do in my late corps. With that equipment my men could skirmish on foot without being in the least impeded by their side-arm. The plan of attaching the sword to the saddle has drawbacks. Troops such as my late corps, and what the Yeomanry may yet, I hope, some day become, should have no fixed tackle about them such as may catch in branches in brushing through woods, or jumping fences. A sword fixed is liable to this drawback, and the plan of slinging the sword to *dees* in the saddle behind, if too low, comes in contact with the horse's hind legs in fast movement; and in jumping, unless the rider sticks very close, the hilt is apt to bound up and get under his fork, thereby incurring very great risk of personal damage. I see Major Edwards advocates repeating rifles and revolvers. My views on that subject are, and always have been, that one firelock is as much as any man ought to have, and that it ought for obvious reasons to be of the same sort, and carry the same ammunition, as that of the line. I must apologize to you for obtruding my views on you; but I am not able to attend the lecture, and consequently am precluded from taking any part in acknowledging the good work Major Edwards is engaged in, and therefore, through you, I take the liberty of tendering my best wishes for the success of the cause.—Believe me, yours very sincerely, J. Bower."

I do not think I should have done my duty to the gentleman who favoured us with the lecture if I had not read this excellent letter of Colonel Bower's. I have nothing more to add, except to ask Major Edwards if he will favour us with any remarks in reply.

Major Edwards: I think there has been some misunderstanding as to my views. I do not at all advocate that the Yeomanry force should be converted into mounted infantry; indeed, I thought that I expressed myself very strongly to the contrary. I am sure we are all extremely obliged to General Hamley and Colonel Mussenden for the kind manner in which they have spoken of the force; but I must say I regret to hear from such distinguished authorities that there is, in their opinion, no room for an intermediate force, as it were, between cavalry and infantry. I was in hopes that the Yeomanry might have been converted into a force which, while retaining a great many of the attributes of cavalry, might gain some of those of infantry, and that this might be brought about merely by introducing a good rifle, and making some changes in dress and equipment. Sir Thomas Acland places us in somewhat of a dilemma by saying that if there are only two arms open to us we must give up the idea of making any change at all. I suggest that we should get out of that dilemma by improving our present position. Getting a really good weapon, and altering our drill to a certain extent, would not in any way deteriorate from our present cavalry qualifications. I can corroborate everything Colonel Mussenden has said as to the horses. I have often seen horses under three years old ridden on a 35-mile march, and at a field day the next and following days; it is wonderful how steady they become even during dismounted service. As to the shooting, I am very glad indeed to be able to corroborate what Major Helyar said. My experience of several regiments has shown me that the men are very keen indeed about shooting. In my own regiment the same difficulty occurred as to the quantity of ammunition. We wrote, as Major Helyar did, to the authorities, objecting that only thirty rounds were allowed per man, and to our astonishment we were informed that sixty rounds were allowed; but we never got them, and we have always had to pay for extra ammunition. Captain McGeorge, of the Carbineers, who is Adjutant of the Westmoreland Yeomanry, has just informed me that the figure of merit of that regiment was higher last year than that of any regular cavalry regiment in the Service. So that I think we may look forward with some confidence to the future of the shooting of the Yeomanry. I know in my own regiment men who, living many miles from a range, go and shoot every week regularly. Then, as to tent-pegging, and so on, the men are very keen about it; but we have to buy tent-pegging apparatus, heads and posts, &c., out of our own funds.

Colonel Mussenden: I may state that I applied for this equipment from the Ordnance Storekeeper in the military district, and I was told—what in fact I knew before—that these articles were issued, on authority, to cavalry regiments for the

use of riding schools, but there was no authority to issue them to Yeomanry regiments, unless by special orders from headquarters.

Major EDWARDS: I think if the authorities would supply us with more ammunition, and with the necessary things for tent-pegging, &c., it would be much better for the Yeomanry. A suggestion was made by Major Acland as to the length of time during which men should be called out for permanent duty,—that it should be increased from eight to ten days. I know in one or two regiments that has been done; instead of having eight days' permanent duty and one or two days' preliminary drills, they have now ten days' permanent duty. That is the case in the Leicestershire regiment, and it has been carried out for a great many years in the regiment to which I belong, but we have the preliminary drills in addition. I am very glad to hear Colonel Marsland's remarks upon the value of dismounted service. It is a great encouragement to the auxiliary forces when Officers who have commanded such distinguished regiments as he has done will come forward on occasions of this kind to give us the advantage of their experience. It seems very uphill work to make any suggestion the carrying out of which will cost money; and, therefore, I have not the slightest hopes that my remarks, with reference to the Yeomanry considered as a reserve, will receive any attention whatever. But, with regard to the value of the force as an auxiliary, I think something ought to be done; and if the authorities would entertain these views of mine, which merely amount to this—that the force shall receive a good rifle, that some slight alteration should be made in drill and in dress, and that the sword should be attached in a different way—the result would be that the Yeomanry would become a very valuable force indeed. On the other hand, if they do not, the responsibility must rest with the Government if the force withers away, and ceases to exist.[1]

The CHAIRMAN: I think no Officer here will disagree with me for proposing a very warm vote of thanks to Major Edwards for his most excellent lecture. The Yeomanry is a force for which every Englishman has a considerable affection, and I am very sorry to hear that it has withered down. I think it might be made a most valuable force, and though there is little hope of making much impression through the medium of lectures upon people in office, yet perhaps some remarks which have fallen to-day may lead to good hereafter, in which case I think the Yeomanry will owe a very great debt of gratitude to Major Edwards.

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[1] NOTE.—With regard to the question of dress, I quite agree with Colonel Mussenden that any change involving expense to Officers, or destruction of *esprit de corps*, would be most objectionable. At the same time the value of the Yeomanry would be so largely increased by the adoption of a general uniform that some steps ought to be directed to secure such a result. If my original suggestion be undesirable I would offer another. Let the present full-dress of regiments be retained for review order, and let an undress uniform, similar to that proposed for the regular army, be worn throughout the force for drill and field day order. The dress might be a light helmet and serge Khakee jacket, over which the present belts would be worn. Officers would be distinguished by badges and belts. The cost of this would be very trifling, and the first issue ought to be made by Government, regiments replacing worn clothing from contingent funds. Boots and breeches, the latter with, if possible, the same coloured stripe throughout the force, ought to be universally adopted. The Winchester-Henry Company would, I believe, supply the necessary number of rifles or carbines for about three pounds apiece. The expense, therefore, of giving the Yeomanry a uniform dress, and an accurate repeating rifle, would be within my estimate of 5*l.* a man.

Friday, April 6, 1883.

ADMIRAL SIR EDWARD G. FANSHAWE, K.C.B., Member of Council, in the Chair.

THE PROTECTION OF OUR NAVAL BASE IN THE NORTH PACIFIC.

By Major-General J. W. LAURIE, late Deputy Adjutant-General of Militia, Canada.

WITHOUT going into any elaborate statistics as to the importance of the British trade in the Northern Pacific, I may say that six months' residence on the coast of Western North America confirmed me in the view of the necessity, both moral and material, for the presence of a British squadron in those waters. Many able writers, foremost among them Captain J. C. Colomb, R.M.A., have pointed out the value of this position to the Empire, and every year adds to the strength of the arguments they have adduced. The Canadian Pacific Railway, which has been too often looked upon as a visionary creation, will, at present rate of progress, be completed in 1885, and if but a tithe of the expectations it has aroused are realized, an enormous trade from the so-called Far East will be carried on in British ships, and throughout, over British territory, thus multiplying our responsibilities in that quarter.

Every act points to the intention of Russia to remove her chief naval depôt from the land-locked Euxine and Baltic (where in the time of war her fleets can be held as closely sealed up as if they were actually blockaded in port) to Vladivostock, on what is practically an open coast, whence they can run out as opportunities offer, and work untold mischief before their career could be brought to a close. The experience of the Federal Navy in blockading the southern ports during the War of Secession, and the regularity and system with which the blockade runners passed the cloud of sentinel vessels employed by the North, show that numbers and experience cannot avail to really shut up steamers in harbour on an accessible coast.

It has been objected that Russia is only doing the same as ourselves, advancing the limits of her Empire, and carrying civilization into barbarous regions, and that we have no more reason to feel suspicious at her extension than she might at ours, but the slightest examination will show that our cases are entirely different.

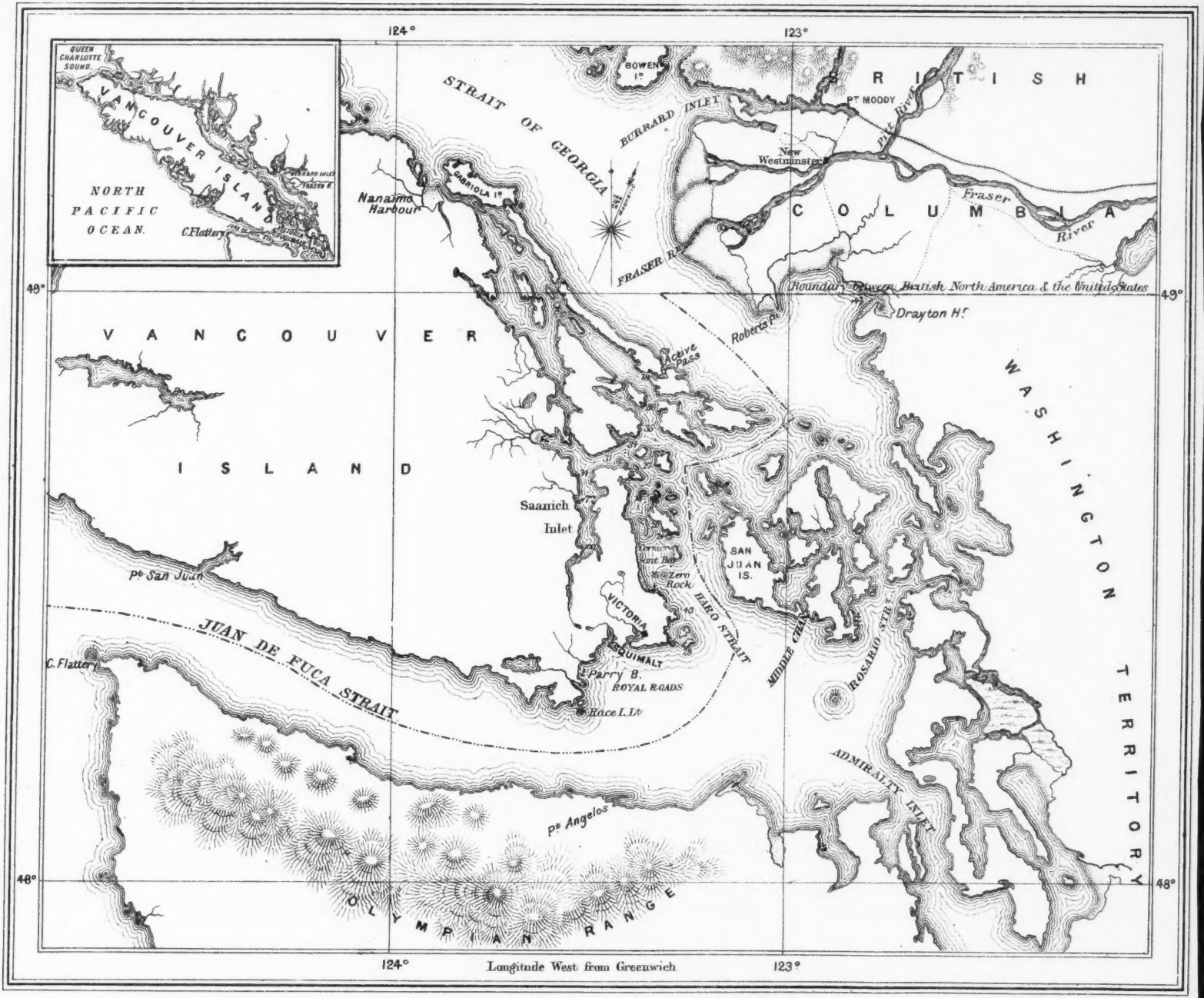
We often describe our increase of empire by the following process: first the missionary, then the trader; and lastly, the man-of-war to

protect the interests thus created; but Russia has struck another line, at least in her settlements in Eastern Asia. There the man-of-war came first, and so far the trader has not followed; in other words, these settlements are exclusively military, and as there is no commerce to require protection, the reason for their existence must be sought elsewhere—not existing for protection, they can only be created for aggression; and the work is done quietly and not with a flourish of trumpets, as if intended to overawe some weak and semi-barbarous Power. It is quite clear that the preparations are not made as against the United States, with whom the relations are studiously gushing, the conclusion therefore forces itself upon one, that but one antagonist is regarded as possible, the only other great Power with large interests and large possessions in that ocean—that is, Great Britain. I am the more confirmed in this, from the tone of the Russian Officers with whom we were brought in contact during a visit paid to Victoria (or rather to Esquimalt) by the Russian flag-ship the "Africa," one of the converted merchant steamers. We were courteously shown over her, her armament pointed out, the expenses of conversion and strengthening discussed, a small matter of 272,000 dollars, or about 55,000*l.*; she carried guns equivalent to our converted 32-64-prs., and was, of course, stated to be satisfactory, but the whole tenor of the conversation was that she was intended to be used against us; that she was to chase and capture our merchant vessels, but was to run from our smallest fighting ships. She was in every way associated in their minds with a possible, almost a probable, war with "you English," and decently masked, but hardly concealed, expressions of regret fell from them that war had not resulted, as they felt they were in a position to do us much damage. I stood it for a time, but as we were standing on the quarter-deck of the "Africa," and this had gone on longer than my patience lasted, I looked up at the ensign, the St. Andrew's cross, and remarked that it reminded me of old times to see that ensign, I had not seen it since it was flying in the harbour of Sevastopol; a hint that the experiment of a war with us had not turned out well enough to encourage repetition.

Japan and China, too, are emerging from their former state of isolation, and will have to be considered in case of any trouble in that ocean, the more so, as they are becoming owners of powerful iron-clad squadrons.

Chili will more than probably be led by her late successes into an overbearing and high-handed policy; and, as the United States have allowed their navy to fall into a state approaching effacement, the duty of maintaining order on these seas and protecting the rights of neutrals (even if we ourselves do not become principals in a war) devolves on the squadron we maintain on the Pacific Station.

It is outside my province to consider the question whether the force maintained by us in the Eastern Pacific is of sufficient strength for its purposes, but such ships as are there should be thoroughly effective, and one point is clear, that the efficiency of the squadron stationed so far from the home dockyards must largely depend on its



NOTE. Soundings in Fathoms

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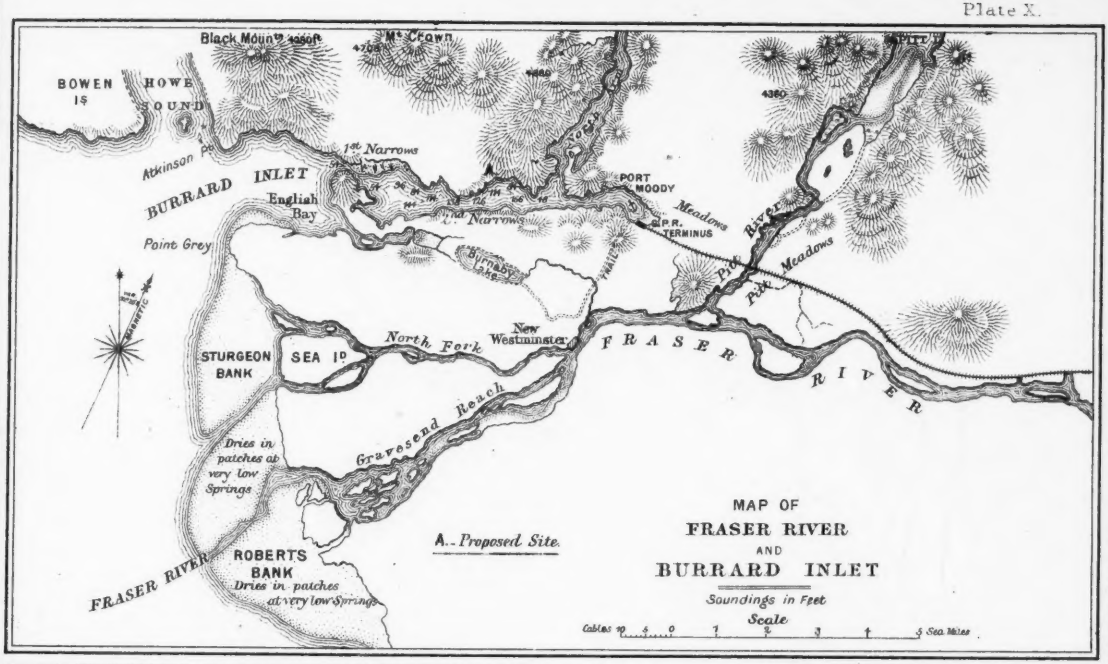
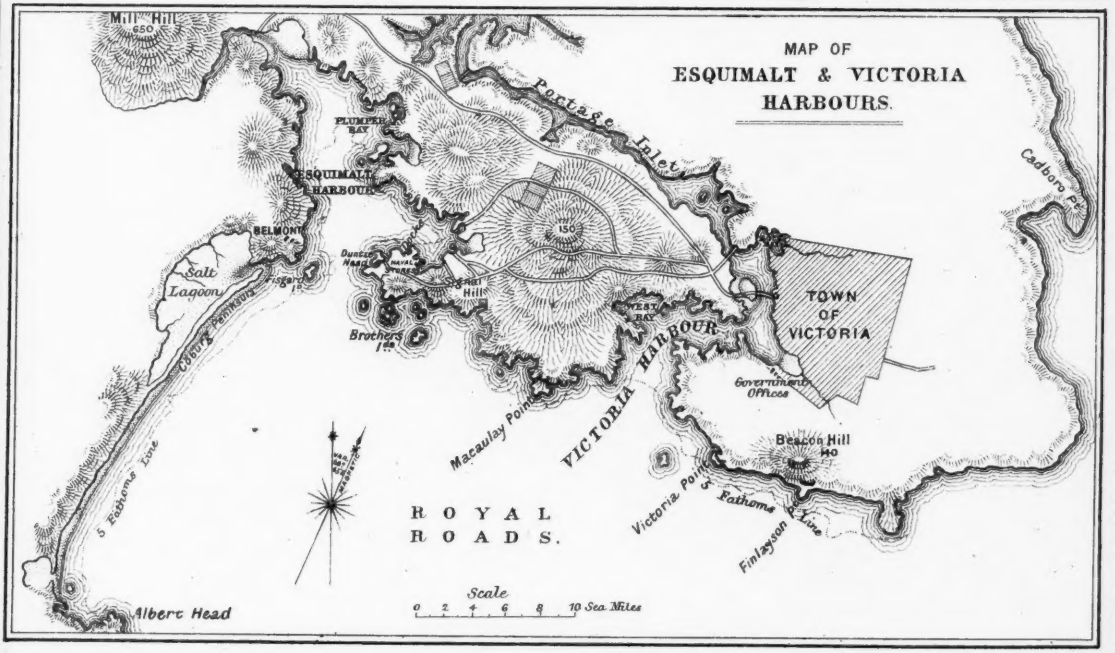

Black Mound 4050ft
Mc Crown
BOWEN I$
HOWE SOUND
Atkinson Pt
BURRARD INLET
English Bay
1st Narrows
2nd Narrows
PORT MOODY
C.P.R. TERMINUS
Meadows
Pitt River
Pitt Meadows
Point Grey
Burnaby Lake
STURGEON BANK
SEA I$
North Fork
New Westminster
FRASER RIVER
Gravesend Reach
Dries in patches at very low Springs
ROBERTS BANK
Dries in patches at very low Springs
FRASER RIVER
A.- Proposed Site.
MAP OF
FRASER RIVER
AND
BURRARD INLET
Soundings in Feet
Scale
Cables 10 5 0 1 2 3 4 5 Sea Miles


Mill Hill
650
MAP OF
ESQUIMALT & VICTORIA
HARBOURS.
Portage Inlet
PLUMPER BAY
ESQUIMALT HARBOUR
BELMONT
Salt Lagoon
Gorge
Duntze Head
Naval Yard
Signal Hill
Brothers I$
ESQUIMALT
HARBOUR
TOWN OF VICTORIA
Government Offices
Macaulay Point
VICTORIA HARBOUR
Beacon Hill
Victoria Point
5 Fathoms Line
Finlayson Pt
Cadboro Pt
5 Fathoms Line
ROYAL ROADS.
Albert Head
Scale
0 2 4 6 8 10 Sea Miles

depôt from which it replaces expended stores, and where the ships can refit for further service.

In the days of Nelson, when sails furnished the motive power and smooth-bore guns the armament, an enemy's ship when captured was the not uncommon source of supply from which stores of all sorts were replenished; but in these days of advanced mechanical art, our ships and their armaments are elaborate machines, every part of which must be thoroughly complete, or the machine is not merely crippled, but absolutely unserviceable; and as coal is contraband of war, it is more than ever important that our ships should have a well-stored depôt near at hand, where suitable supplies of every kind, for vessels and guns, as well as coal for engines, should be obtainable; but in time of war we could not retain or obtain these supplies in neutral territory, and there is thus but one place in the Northern Pacific where we have the right to get a ton of coal or keep a pound of gunpowder—that part of Canada known as British Columbia, of which Vancouver's Island politically forms a part, and which happily furnishes an unlimited supply of coal, the best on the Pacific coast.

Esquimalt Naval Yard.

Vancouver's Island on the extreme west of Canada, like Nova Scotia on the far east, is indented with bays, many of which are first-rate harbours; but in establishing a naval depôt, it was of course essential to place it where supplies, such as fresh provisions for the crews, could be readily obtained, and in the then sparsely settled condition of British Columbia, it was not at all unnatural that a suitable harbour as close as possible to Victoria, the centre of population, and the principal market for the produce, not merely of Vancouver's Island, but of the Puget Sound districts of Oregon, should have been selected, and a glance at the map will show it not to be badly placed for the command of Puget Sound; possibly it would have been better situated if altogether outside the straits, as saving six hours in getting fairly to sea, but the navigation of the straits is easy, and vessels generally come up under sail to Royal Roads outside Esquimalt, where the naval yard is situate, well to the south-east part of the island.

The history of this yard affords an amusing instance of how we "drift" in our arrangements. When during the Crimean War the English and French squadrons united for the purpose of making the disastrous attack on Petropaulofski, the then Russian arsenal in the Pacific, our naval authorities obtained the use of a house on a point of land at the entrance of Esquimalt Harbour, and fitted it up as a hospital; from this beginning our naval yard has grown, and in a most unsuitable and exposed place, actually on the spit of land that divides the outside water, the Royal Roads, from the harbour, as if to encourage and invite hostile intentions; and vessels lying in the harbour, instead of in any way being able to cover the dockyard, and protect it with their guns, would have it between them and the assailants, and would actually have to fire over or through the dockyard, in order to assist in its defence.

A dry dock is in progress of construction close by the naval yard, but, at present rate of progress, it will hardly be available for use during the present century, so that the consideration of providing for its protection can hardly be considered a burning question. Esquimalt Bay is so landlocked that it makes a capital harbour, and will accommodate a very fair number of ships; it is situated about 4 miles by road from Victoria, and in fact forms the deep water harbour of the town, as Victoria Harbour is only to be entered by large sea-going ships at high tide, and the mail steamers which leave for distant ports, such as San Francisco, at a fixed hour, start from Esquimalt, where they are independent of tide.

Why Victoria, the capital, which aspires to be a commercial town of the first magnitude, was placed on the comparatively shallow and difficult harbour is a matter that can be best explained by the Hudson Bay Company and its officials; the former had a fort and a trading port there, and business clustered round this, until vested interests, hard to disturb, were created, and it became the seat of Government. For the actual purposes of the ships, Esquimalt in time of peace satisfies, I should think, all the necessary conditions; a good harbour and easy access to stores; with fresh supplies at a reasonable rate; but my duty required me to look upon it in a different light. I had to regard it as a position to be defended in case of war, and with such material as was supplied me, or which, on an emergency, I could improvise.

In accordance with some recommendations made, I believe, by the Colonial Defence Committee of 1878, some batteries were erected by Lieutenant-Colonel Irwin, R.A., who was sent out in that year by the Canadian Government for the purpose; these may be seen on the plan, and are well placed for the purpose of carrying out the instructions he received. In some of our earlier experiences in India, when our troops were sent to attack hill forts, the attack was delivered on the gate, which was found to be carefully fortified, and the attack failed; whilst it was afterwards discovered that the other defences of the fort were so dilapidated, that it would have been possible to have got in anywhere, except at the gate. Now this is pretty much the view I hold of the present defences of Victoria and Esquimalt; if an enemy's cruizer will obligingly attack directly in front, he will find guns mounted to bear on him, but if he will betake himself behind Clover Point or to Ross Bay he can keep out of the way of our guns and destroy Victoria; or, by landing a very moderate party of men, can enter the batteries from the rear, and either spike the guns or tumble them over the bank. I do not say this as criticizing Colonel Irwin's arrangements in any hostile spirit. He was sent out there with certain definite instructions, and a very limited command of money for the work of construction. He found but a small amount of material available, simply some of the small reserve of guns kept at the naval yard to meet the pressing wants of the squadron. He was authorized to raise a battery of Volunteer Militia Artillery, at first fifty men, afterwards increased to eighty-four; he had also to bear in mind that he was spending the money of the Canadian tax-

payer; it was necessary that he should, in appearance at least, take steps to protect the taxpayer's property. If his means did not enable him to block and guard every road by which an enemy could approach Victoria and Esquimalt, he showed good judgment in doing all in his power to guard that which was most easy of approach. An enemy coming to Vancouver's Island must necessarily come across the water, it was at any rate a point gained, that he should not be able to sail unopposed right into either of these harbours.

In 1879, a very able Officer, Colonel Lovell, R.E., was sent by the Imperial Government to report on the defences of British Columbia. His report has not been published, but the instructions he received were also communicated to Lieutenant-Colonel Strange, R.A., who accompanied him, and these and Colonel Strange's report appear in the Canadian Blue Book, and I will quote these instructions.

To report in detail on the following points:—

1. The means to be adopted for placing the harbours of Esquimalt and Victoria in an efficient state of defence by permanent works; the extent to which the temporary works may be made available being reported.

2. Whether the two harbours can be considered independently, or whether, on the other hand, the scheme of defence must necessarily embrace both, bearing in mind that Esquimalt as an Imperial station is of primary importance.

3. The garrison required to be permanently maintained, and the the manner in which such garrison should be constituted, stating the extent to which assistance in this respect may be expected from local resources.

In a second letter of the same date Colonel Lovell is requested to visit Nanaimo, as its defence may become a matter of importance on account of its coal supplies. Also is told, that any views he "may form generally, on the measures to be taken for the defence of the Pacific coast of Her Majesty's dominions in the event of war, bearing in mind its distance from any established naval arsenal, and the difficulties which must, therefore, attend hostile operations directed *against* it," will be gladly received by the Secretary of State for War.

A very important alternative was therefore apparently not opened to him, the power of recommending that Esquimalt was practically indefensible with the means at command or likely to be furnished; and that another site equally advantageous as a naval yard, and with capacity for defence, might be substituted.

Colonel Strange very pointedly calls attention to the mistake in the last paragraph of the second War Office letter, as to our possessions on the Pacific coast being so distant from any established naval arsenal as to make hostile operations *against* them very difficult. He points out that the United States not merely have a large Government establishment at and near San Francisco, they also have, immediately available, the resources of that city of 350,000 people, a city, I would point out, whose industries are largely devoted to the provision of machinery for the great mining districts of California, Nevada, and now Arizona, and to the supply and refitting of the enormous com-

mercial shipping that enters the Golden Gate, consequently specially suited to equip a maritime expedition, whilst the overland railway will bring the almost unlimited supplies of men and material of the highly developed Eastern States, in from three to six days' travel, to strengthen an expedition which might be there fitted out. The United States' Government recognizes the importance of San Francisco as a possible base of operations, for although the squadron there is small, indeed but nominal, San Francisco is the military headquarters of the West, and large barracks and strong fortifications show that they recognize the necessity for preparing for eventualities.

I need not again refer to the power that Russia is developing, but only repeat and endorse what Colonel (now General) Strange, in his report, so emphatically points out, that "the difficulties of defence are under present conditions much greater than the facilities for attack, and that the bases of hostile operations are much nearer than is implied in the last paragraph of the letter" I have quoted.

So much for the possibility of the organization of a hostile expedition against Esquimalt. We now have to consider how far it is capable of defence. That the temporary defences erected by Lieut.-Colonel Irwin were not considered sufficient, is proved by the mission of Colonel Lovell, R.E., and later of Colonel Crossman, R.E., and the instructions given to the former. Colonel Lovell's report has not been made public, and I was unfortunate in missing Colonel Crossman, who finished his inspection and left Victoria the evening before I arrived there; I am therefore unable to quote their views, and will only express my own.

I have already pointed out that, in its present position, the naval yard at Esquimalt is very exposed, being but a few hundred yards in the rear of the battery on Brothers Island, the most advanced point on which a gun could be placed; so that any hostile cruizer lying off at such a distance as would expose it to but small risk of injury from the 9-ton gun at Brothers Island, could put shell into the naval yard and utterly destroy it; as it, at extreme ranges, would present a far larger mark than a single small vessel; or, in the event of a nearer approach, one gun could be held in check and its attention occupied, whilst other guns did the required mischief to the dock-yard. It follows clearly, and I think all authorities will support this, that even if Esquimalt were retained as the port, the buildings must be removed, and re-erected at the inner end of the bay. I mention this now, as the question of expense of rebuilding the establishment may cause an objection to my proposition, and this I maintain must in any case be incurred. I need hardly say that I am quite of the opinion, that if works of sufficient strength, and armed with the required guns, are erected on the sea front, no hostile squadron could force its way into the harbour, at least until the guns were overmastered and silenced, and to this contingency every fortress is liable; but even when the front door is made secure, there remains not merely one back door, but the general question of an approach by land from every or any point. The plan will show the weakness of the position. It is not that Esquimalt is vulnerable from one point only, for, if so,

steps might be taken to protect one weak place, but situate on a peninsula, surrounded by bays, it is approachable on all sides. An expedition, large or small, could land anywhere at from one to three hours' march from the dockyard. We know what our young naval Officers, Burgoyne and others, did on the Sea of Azof during the latter part of the Crimean War, how two or three daring men carried fire and destruction to the Russian stores on the road to the Crimea, and these lessons are open to imitation; the whole coast is open for the landing of a daring boat's crew; and for such a work of destruction there is no necessity for a permanent occupation. The depôt produces nothing worth continuous retention, its stores would be of enormous value to our squadron, of comparatively small use to others; it is their destruction, not their appropriation, that an enemy would seek; but if the object were to seize and hold by a stronger force, from Sooke Inlet to the westward, all the way round the coast to Saanich on the north, are bays and beaches, where the flotilla could lie at anchor and an expedition be landed at ease. In the neighbourhood of Sooke the country is not very practicable, being heavily wooded, but troops could work their way through it, if time was not an object; from all other points the country is open and practicable everywhere. It has been suggested that, by abandoning Victoria and fortifying the portage or neck between the head of the north arm of Victoria and Esquimalt harbours, the Esquimalt defence would thereby be made safe; but all the population, all the wealth, and all the resources of Victoria, would at once be abandoned, and the low shore on both sides of Victoria Harbour, and its smooth water, would admit of a force crossing anywhere, even if boats were not obtainable, by rafting material, easily procurable from the buildings in the town, or from the woods which are scattered along the water's edge.

Any site can be fortified, and if not made impregnable, can at least be enabled to hold out for a certain length of time. Engineering skill, and we have, undoubtedly, as able engineers as are to be found in the world, will readily compass this, but it means money to construct and arm, and a strong garrison to be constantly kept up, both to maintain the works in peace time and to defend them during war; a garrison, too, which must here be retained at its war strength, as it is not possible to increase it at short notice from any other part of the Empire.

I am not in the secrets of the authorities, but the conclusion I came to was, that to provide properly for the defences of Esquimalt, would require such an outlay, both in permanent works and subsequent annual charge, that no British Government would listen to it, and that there was therefore little hope that Esquimalt could be made as secure as our solitary naval depôt in those seas should be. The local forces are, of course, enrolled for the defence of Canada, and maintained out of Canadian pockets; and Canadian homes and property have the first right to their services; both public spirit and good policy would, however, lead to their services being at once given for the protection of the British dockyard, but they can only be looked on as auxiliaries; a reserve force to strengthen the garrison, not the

sole defence; and the total available strength that could be furnished is but small.

Taking the proportion of fighting men in a population as 1 in 7, an outside estimate, as I know from long experience, the 16,000 white people of British Columbia would not furnish much over 2,000 men to carry arms, but a portion of these are aliens owning other allegiance, and as the population is scattered over many hundred miles of country, not more than one-third of them could be concentrated at short notice for the defence of such forts as might be proposed; a number quite insufficient to man water lines, extending round Victoria and Esquimalt Harbours and the Isthmus forts; because, however small the attacking force might be, it would have its choice of the point of attack, and as it could be more expeditiously moved by water than the defenders could, with present means of communication, move by land, it could, by judicious feints and occupying the attention of defenders, and so keeping them scattered along the line, have the preponderance of numbers at the actual point of attack.

There is, of course, the alternative that the squadron, or a portion of it, should remain at Esquimalt and act as the garrison and defend its own base, but this hardly requires a second thought. There can be but small object in maintaining an expensive seagoing squadron if it has to remain in harbour to protect its stores; the ships would not serve the purpose for which they were sent to the Pacific Station, and if maintained at all, would be more usefully employed in the British Channel; barracks cost less than ships to maintain, and economy, with equal efficiency, establishes that the garrison must consist of a force on shore which can never be withdrawn on some will-of-the-wisp expedition, and will thus leave the naval commander perfectly free to use the whole of his ships on the high seas for the attack of the enemy's coast or the protection of our own.

Nanaimo Coal Supply.

But even supposing that Esquimalt were satisfactorily occupied and defended, the most important of our requirements would still be at an enemy's mercy. Nanaimo, to which Colonel Lovell's attention was directed as the source of our coal supply, would not be protected from hostile attack unless independent works were provided. An expedition launched against it from the Puget Sound ports would not have to pass Esquimalt, and, even if notice of appearance of the expedition were sent to the vessels stationed there, they would but arrive in time to witness the destruction consummated, not to prevent it. With the shipping piers, &c., at Nanaimo destroyed, our vessels would be dependent on sail power—a pleasing condition for our mercantile, as well as our militant, marine. Of course, coal could be stored in quantities under the guns at Esquimalt, but the supply could only be limited, considering risk of loss, certainty of deterioration, and enormous increase of expense; it is therefore in all respects desirable to maintain Nanaimo rather than Esquimalt as our coaling depôt, where the supply would be cheaper and practically inex-

haustible. But it is also important to prevent an enemy not merely stopping *our* obtaining coal from Nanaimo, but obtaining possession and holding it as a source of supply for his own ships. A garrison shut up in Esquimalt would hardly guard against this, and the vessels there, as stated, could not readily prevent it. I may incidentally mention, that the managing owner of the Wellington Colliery at Nanaimo, *that* from which the largest portion of the coal is mined, Mr. A. Dunsmuir, is a most liberal and public-spirited Scotchman, and if his sympathies were enlisted, by giving him some official connection with the defensive organization, I believe that a very moderate outlay would put the coaling station in a position to resist any isolated attack.

Canadian Pacific Railway Terminus.

Next to the importance of protecting the coaling station, on which I have not dwelt at the length its importance deserves, because I conceive this is patent to all, comes the new question of protecting the terminus of the railway which in two years from the present time will be an accomplished fact; a railway which will no longer leave British Columbia an isolated province, with its communication with the rest of the Empire only through an alien territory or by a long and circuitous ocean voyage. In 1885 we are promised that the Canadian Pacific Railway will be open from end to end. In six days from Montreal, in thirteen days from Liverpool, we shall be able to reach the Pacific. I may be told this destroys my argument as to the necessity of maintaining a naval depôt on the coast, but to my mind it rather increases the importance of the station, as it puts us in a better case to take up the best defensive position, the offensive-defensive, to fit out and strike from there, to defend our coasts and our commerce by as much as possible carrying the war with all its disagreeables on to the enemy's coast and positions. In any case the railway terminus *must* be adequately protected; the large through trade that is certain to follow the completion of this route will bring an enormous mercantile marine into these waters, and it will be of prime necessity that there should be a position under our own guns where they can shelter, and whence they can work in concert with our men-of-war, who may be charged to protect them. A large mercantile harbour, such as Burrard Inlet, the proposed terminus of the railway, must be, if left without defences, can only be likened to a huge rat-trap into which our vessels would all be gathered, so as to fall the more readily into the hands of an enterprising enemy, and save him the trouble of hunting them down one by one on the high seas.

We thus, by retaining Esquimalt as our naval station, expose ourselves to one of the two alternatives, for by leaving it in its present open and unprotected state, it is certain to be destroyed at the outbreak of a war, or by undertaking a very heavy charge in permanent works and garrison, we put it in a comparatively defensible state, but we leave our coal and railway communications unguarded and exposed, or must again at a large expenditure provide for the protection of each of these. We thus fritter away our force in

attempting to guard three points, on each of which an emeny could practically concentrate his whole strength, and so destroy our position in detail.

It is from consideration of all this that I am led to recommend that our naval depôt at Esquimalt be abandoned, and that one be established at Burrard Inlet. We are thus enabled to concentrate our available means of defence, making *that* the centre of our position; it is placed immediately opposite to Nanaimo, and can thus much more readily render assistance to that point than could be given from Esquimalt. In fact, an expedition coming from the south against Nanaimo could be observed, and met on the Straits of Georgia by ships from Burrard Inlet, whilst, as already mentioned, vessels from Esquimalt could only arrive after the mischief was done. Any protecting works considered necessary at Nanaimo could for these reasons be on a smaller scale, as assistance could be obtained so much more quickly.

Future of Victoria.

It may be objected that it will be unwise to leave Victoria entirely exposed and undefended, that it would be bad policy to, as it were, abandon Victoria, with all its wealth and commercial interests, the more especially as it is the seat of the Government of the Province; that great irritation would be caused and bitter feelings aroused in this, the largest community and from which the public sentiment of the Province largely takes its tone. I am aware that prejudices will be aroused, and in such a loyal community and one so thoroughly British in sentiment as that of Victoria, I would be most unwilling to create any soreness, but I believe that what I recommend is for the true interest of the people of Victoria themselves.

A few enthusiasts believe that the goods in transit over the Canadian Pacific Railway will be transhipped at Victoria, and thus it will be actually the terminus of the ocean trade. I can see no grounds for this view; ocean steamers pass to Nanaimo now for coal, and Burrard Inlet was selected as the terminus of the Pacific Railway on the strength of evidence to which I shall presently allude, as the most suitable place for carrying on through traffic, on account of its accessibility for ocean-going steamers; hence I conclude that the traffic will centre at the harbour in which the terminus is placed, and no transhipment will take place.

Victoria will then depend mainly on the trade of the coast and of its own neighbourhood; a trade that will unquestionably largely increase as the Province fills up and the fisheries, mines, and milling interests are developed, and will make it a place of considerable importance, but it has in my opinion a brighter future before it beyond its commercial prospects. It has a charming and very equable climate, the thermometer not registering above 74° in the shade in August, and only two or three degrees of frost in January; these are the extremes of temperature usually experienced, and old settlers say they never saw snow there, until after the Colony joined the Canadian Dominion, and thus, they think, acquired Canadian weather.

The air is most invigorating, very pure, largely, it is said, owing to the presence of large quantities of snow on the Olympian Range, just across the Straits of San Juan de Fuca; these mountains show their northerly slopes to Victoria, they run up to over 8,000 feet in height, and the snow-line on this northerly exposure is about 4,000 feet above the sea-level, and the light and shadow caused by the early morning or late afternoon sun, when it gets well to the north, on the deep and sharply-cut valleys and successive ridges, present one of the most beautiful pictures nature has ever painted, and one does not wonder that H.R.H. the Princess Louise could hardly tear herself away from such a lovely scene.

The country in the neighbourhood of Victoria is park-like—scattered oaks and open glades of grass—the ground very broken, but accessible everywhere, quite different from the mainland, where the mountains are bold and often impassable; the woods are full of game, the rivers of fish, and the various channels that surround the island form a perfect paradise for a yachtsman.

Everything points to Victoria and its neighbourhood becoming, what I must style, for want of a better name, the playground of the Pacific coast.

The cold damp winds coming in off the Pacific drive the residents of San Francisco, far to the south as it is, out of town even in the month of July, to get *warm*, whilst in the interior of California the summer heat is great; the coast from the Golden Gate to the Columbia River is almost inaccessible. Oregon and Washington Territory are growing fast in wealth and population, but the seaports are unhealthy, and the interior is hot in summer, and cold in winter, and from both extremes the people of means try to escape. Victoria offers them all they ask; the society, largely fed from University graduates and retired army and navy men, is very pleasant, and all who visit it once long to return; the number of visitors increases yearly, and where business does not take men eastward, I believe that, for people of means, in the great territories west of the Rocky Mountains, Victoria will be the point for which holiday seekers will make; the Isle of Wight of the Pacific with the immense advantage of having a summer and winter season; the pleasure ground of a large and wealthy population, who work hard to acquire, for the purpose of spending liberally in the pursuit of enjoyment.

I do not think Victoria will become less English in consequence of this future, but it will be of less importance for its prosperity that it should retain the naval station at Esquimalt; in fact, I go further, and hold the opinion that it is better for its own interests that Victoria should be an open town, than be included within the scope of a line of defence containing the naval arsenal. As such it would of course be open to destruction by an enemy as a portion of the system of defence, but the tendency of modern warfare has been to leave uninjured, open and undefended towns, unless they can be looked upon as the sources of supply of contraband of war. Odessa was a case in point in the Black Sea in 1854; and in the Crimea, whilst we set ourselves to destroy the military port of Sevastopol, and all the

Government buildings, we did not even make a demonstration against Yalta, equally Government property, but recognized as not utilized for warlike purposes, and therefore looked on as exempt.

Undoubtedly prospective booty, such as the wealth of Victoria, would invite raids from marauders, who would assume the position of belligerents, even if not directly sanctioned by a hostile Government; against such, the inhabitants must be organized to protect themselves, and for this purpose a development of the present organization of the local forces would suffice. Artillery, not tied down to guns mounted in a fixed position, which can be taken in reverse and rendered useless, but what I recommended over and over again as the best defence for the outlying districts of Nova Scotia—guns of position, such as 40-pr. Armstrongs, which (unlike fixed garrison guns, instead of being constantly exposed to decay and destruction from weather, and so costing heavily annually for maintenance of batteries and platforms, as well as painting of carriages and lacquering guns) can be stored in a shed, and only brought out when required for drill or practice, or service, and which can be drawn by farm horses, or teams of oxen, to the point where an attack is actually threatened, and can be advanced or retired for continuous use, and supported by parties of infantry, whom they in their turn will strengthen, and enable to choose their position for attack and defence, whereas with stationary guns the supporting force must think rather of the guns than of any independent action it may desire. Such an equipment of the present force would render it better able to protect Victoria under the conditions I have named, and would not invite an attack on the grounds that it was a depôt of warlike stores.

Navigation of the Straits of Haro.

It may be urged that the Straits of San Juan and Haro are difficult of navigation, and that a crippled vessel would find it difficult to reach Burrard Inlet through the archipelago which intervenes before the Gulf of Georgia is reached; undoubtedly it would be more convenient if these islands did not occupy so much of the channel, but we have to deal with the case as we find it.

The selection of Esquimalt as a naval station was made, and wisely made, when sails were the principal motive power of our men-of-war, and the time required for working under sail through these straits was a matter to be seriously considered, but with steam power the case is materially altered. In 1876 the Government of Canada addressed an official communication to the Admiralty, through their engineer, Mr. Sandford Fleming, requesting to be furnished with the fullest information as to the harbours on the coast of British Columbia and their approaches from the seaward; and Mr. Fleming, not getting from the charts and reports at first furnished such information as he desired, in order that the Government might come to some decision as to the terminus of the Pacific Railway, prepared a memorandum, and a series of twenty-eight questions; in the former he pointed out that, although the railway was to open up and develop the country, still, as no local traffic at present existed, it was important

to give due consideration to through trade, and to select such a terminus as would give the greatest facilities for competing successfully with foreign routes for ocean-borne traffic. This opened the door to the recommendation of any harbour between the 49th and 55th parallel.

The Admiralty, according to the official letter forwarded to the Colonial Office, obtained answers to this memorandum, and these questions, from the "naval Officers who, in their Lordships' opinion, were most likely to be able to give useful information on the subject," viz., Vice-Admiral Hon. A. A. Cochrane, Rear-Admiral C. H. Richards, Vice-Admiral Farquhar, Captain R. P. Cator, Captain W. Graham, Staff-Commander Pender, and Lieutenant W. Collins.

The greater portion of the questions related, first, to the distances from the coast of Asia to the several entrances to channels between the islands and the mainland, next to the distance from each channel to seven of the harbours of the mainland, selected as offering the greatest advantages as well as accessibility by land, also to the anchorages in and around those harbours; but the last two questions, which I give in full, convey the gist of the whole matter.

Q. 27. Mention any special advantages or disadvantages appertaining to any of the seven inlets herein alluded to, which have not been touched upon in the foregoing questions, and give replies thereto.

Q. 28. Having regard to naval and commercial considerations, mention the point on the coast which appears to you the most suitable for the railway terminus, and designate the other points to which reference has herein been made in the order of preference.

Admiral Cochrane considers "Burrard Inlet offers the greatest advantages, although he thinks, in the future, when the country is developed, the terminus will be transferred further north."

Admiral Richards says, in a nautical point of view, "Burrard Inlet is in every way preferable," and he "gives a preference to Fuca Straits over the other channels."

Admiral Farquhar says, "Burrard Inlet is at no great distance from a wide channel, has a deep clear entrance, possesses a splendid harbour, and a fair anchorage outside, and is almost immediately opposite Nanaimo, the great coal depôt, and, if practicable for the railway, he would give the preference to Burrard Inlet."

Captain Graham and Lieutenant Collins do not answer either of these questions.

Captain Cator considers Burrard Inlet as too near the frontier for a railway terminus, and the entrance through the Haro Straits as unsatisfactory, on account of the possession of the Island of San Juan by the United States, but a reference to Captain Cator's evidence shows that he is under the impression that a vessel going up our waters must pass within $2\frac{1}{2}$ miles of San Juan, a view which is not borne out by other professional evidence.

Staff-Commander Pender considers that Burrard Inlet, with its anchorages, is of the greatest value and preferable to all others as being also the most easy of access from the ocean, although the risk

of navigating large steamers against time is to him very great. "He also considers the southern approach to the mainland to be so well defined, charted, and lighted, as to be made present use of by any class of ships."

The preference being thus almost universally given to Burrard Inlet, for even Captain Cator's only objection was its proximity to the United States' boundary, we now examine the remainder of the questions only as bearing on the approach to Burrard Islet, and find that ocean-going *sailing* ships require to be towed about 70 miles from Race Rocks outside the entrance to the Straits of Haro, to the entrance of Burrard Inlet, or 90 miles to Port Moody: in other words, that steam power must be depended on by our vessels for this distance; for such a short distance, and so close to port, auxiliary power, in the shape of dockyard steamers, might certainly be provided in war time, to help crippled ships, or as there will certainly be an increased sailing trade on this route, dependence might reasonably be placed on the commercial community, who are sure to maintain tugs which can be hired or requisitioned.

The most important consideration must, however, be given to the opinions given, as answers in reply to Questions 7 and 8, as to whether, in the event of hostilities with the United States, the course of vessels would be so exposed as to render the approach to Burrard Inlet difficult or hazardous; and at what minimum distance they must pass San Juan or other points of United States' territory.

All agree that, if the Americans have command of the sea, the approach will be hazardous; that, of course, is undoubted; our squadron is there to maintain the command of the sea, not merely to pop in and out like a rabbit out of a burrow, but the larger question is, to my mind, whether, if *we* retain the command of the *sea*, *we* can pass in and out?

Captain Graham says that we must pass within about $4\frac{1}{2}$ miles of San Juan, Captain Cator, speaking from memory, says $2\frac{1}{2}$ miles, and that is true of the passage generally used, which, as Admiral Farquhar says, is commanded by the bluff on the northern end of San Juan, if armed with heavy guns; but there is a passage much nearer to our coast, which, as mentioned by Admiral Cochrane and Commander Pender, takes ships past San Juan at a distance of 5 nautical miles.

I never like to discuss the question of war between ourselves and the people of the United States; we are too much alike, come from the same stock, speak the same language, and are engaged in working out the same results; but there is another matter in connection with this San Juan question which should not be forgotten. The mere fact of a piece of territory belonging to another Power does not, in time of war, imply that that Power *must* retain possession of it. A battery of heavy guns at San Juan must remain *effective* to be a menace; it must be superior in metal to the ships, else it can surely be dealt with and silenced; it must be guarded by a force on land superior to any that can be sent ashore from the squadron; no naval commander would leave a battery on his flank and slink past it,

unless it were so much more powerful that he could not attack it with a reasonable prospect of success. He might not be able to retain possession, but he could perhaps hold it long enough to throw the guns over the bluff, rendering them incapable of further mischief.

If the land force for the protection of the battery were strong enough to prevent our landing and destroying it, in fact strong enough to hold it against any force that we could bring against it, this same land force would be strong enough to overpower us in our own territory, and it follows, not that it would be undesirable to move our base to Burrard Inlet, but that it would be madness to keep it at Esquimalt; where, indeed, we could not keep it, because the settled portion of Vancouver Island and all our supplies would be at once taken from us, and either destroyed or held.

In a comparatively impregnable position at Burrard Inlet, we should at least have our stores safe, our coal depôt guarded, and our railway terminus protected, until we obtained reinforcements; and our vessels, if they could not sail boldly past San Juan, could at least find their way in and out, with comparatively little risk, at a distance of 5 miles from the American guns.

It should also be borne in mind that our burrow has a back entrance, not one that a hostile cruizer, coming in a hurry and with every probability of having to leave in the same way, would care to use; it is difficult, and, when pressed for time, may be called dangerous, but our own ships, knowing the channel well and taking their time, could use it on an emergency, even if it is not all that could be desired. I mean they could enter or leave by the middle channel between Vancouver Island and Queen Charlotte Island, passing down through the middle channel between Vancouver Island and the mainland.

The Canadian Government, after considering all the evidence that could be obtained, decided to make Burrard Inlet the ocean terminus of their through railway, and where mail steamers running against time can navigate, it is but fair to believe that our men-of-war can pass.

In the map I have shown six-fathom soundings through the Haro Straits, and, intricate as the navigation may be, it seems perfectly practicable, although of course the water is deeper, and course more open in mid-channel. Assuming then that it is perfectly practicable for our ships to approach Burrard Inlet, we now come to the question, "What advantages it offers."

Burrard Inlet.

The enlargement of the Admiralty Chart shown gives an idea of the capacity of the harbour, which is nearly 20 miles in length; the entrance is narrow, a few hundred yards wide, making it perfectly landlocked; inside there is room for the whole navy of Great Britain; good anchorage at Port Hastings, where there is a large milling establishment, and large fish oil works; again good anchorage at Moodyville, a large steam mill (to be distinguished from Port Moody, the latter being named after Colonel Moody, R.E., the first Govenor of British Columbia, the mill being called after one of the partners, an

American from Maine, who originally established it). On account of the enormous water area of the harbour and North Arm, at a full ebb and flow the tide runs with great speed through the narrows at the entrance, also through the second narrows, but not to the extent often represented. I have passed through both in a lightly engined steam launch against the full head of the tide, and certainly any full powered steamer could do so, or if it were necessary from any cause to wait till the tide slackens, there is magnificent anchorage in English Bay, immediately outside the entrance.

Immediately inside the second narrows on the north shore of the Inlet is a most eligible site (from a defensive point of view) for a naval yard. The anchorage is reported good in front; on its left flank, or eastern side, is the cliff-bound fiord, known as the North Arm, inaccessible to boats either to embark or to land; in rear is a range of mountains which may be considered quite impassable for any body of armed men; to the westward the cliffs rise up hundreds of feet sheer from the water on Howe Sound, making landing virtually impossible; and the country between Point Atkinson and the entrance to the Inlet is so rugged and wild that armed men, with the most ordinary equipment, could not make way through it; it is therefore only accessible from the front, and this must be by water either through the narrow entrance or across the Inlet.

The outer narrows are but a few hundred yards wide, commanded on the south by a high bluff, from which guns could bear both on vessels coming up from outside, and on any that might have run the gauntlet and be passing up the harbour. Two low points on the north side offer desirable positions for batteries to deal with vessels attempting to run close in under the south bluff. Long-range guns on Points Grey and Atkinson would, if deemed necessary, protect the outside anchorage, and form an additional obstacle to vessels coming in from seaward.

An enemy coming across the 49th parallel and desiring to reach Burrard Inlet, would first have to cross the Fraser River, and would be actually limited to that portion of it between the junction of the Pitt River and the delta of the Fraser; boats or canoes could, of course, be brought by teams from the boundary to any point on the Fraser, and an expedition could be embarked; but on the spit of land between the Fraser and the Pitt, transport for boats could not be obtained, and the undergrowth would almost bar the passage to an armed party: descending the Fraser and ascending the Pitt, the Pitt meadows, which are a deep swamp, would bar advance towards Port Moody. The railway to be carried across these meadows would be the only road by which the Inlet could be approached in that direction, and on such a narrow front a few men would hold out against a much larger force, or the railway here, which will probably be a viaduct, could be rendered impassable at this point. Below New Westminster the river separates into four arms, and if the first were passed, the boats could not be carried across the intervening islands, and even if the brush on the low islands were passed, the next arm would prove an impassable obstacle. There are

at present but two roads from the Fraser to the Inlet, and these both pass through New Westminster, which is therefore the key of the position, and the organized force of that city, supported by light guns, would make it very hot for an expedition coming down the Fraser to land at this point, and if the landing were effected, our troops could take up a series of defensive positions on the road to the Inlet, as the forest growth is too thick to allow of any flanking movement; whilst, even if successful in fighting their way to the water's edge, the enemy would still find the harbour between them and the dockyard, and be without any means of crossing.

My proposed naval depôt will be but thirty hours by rail from the fertile plains and great food-producing districts of the Saskatchewan, with which it will of course be in direct telegraphic communication, and as these territories are being rapidly peopled, they would pour down, not merely supplies, but reinforcements of men to assist in repelling any attack in force, an aid that could not be furnished to Esquimalt if our garrison there were attacked, and we had temporarily lost the command of the sea during the absence of our squadron.

Our position would be materially strengthened by shortening the line of communication with our original base, England, and our intermediate base, Eastern Canada, and by establishing our main place of arms at the most vulnerable point, where everything must be transhipped if Esquimalt is to be retained.

I have endeavoured to show the advantages of my proposition; I have not sought to minimize the objections; I conceive it to be an Imperial question, but one in which Canada as an integral and increasingly important portion of the Empire is much interested, and, as an Imperial Officer, whose service has been largely with our Canadian comrades in arms, I have felt it was not out of place that I should bring forward this subject for serious consideration.

Captain CURTIS, R.N.: It seems to me that there are two points which are of importance in relation to this subject. The first is, that we should be able to blockade both inlets with our fleet; for unless we can do that, I do not think we should be able to hold our own in that neighbourhood; and the second point is, that I should like to know whether, if the line shown on the map be a neutral line, any nation at war with us but at peace with the United States would be able to come up within that line without our attacking them? I know some little about Burrard's Inlet. Mr. Pearce, the late Surveyor-General of North-West British Columbia, happens to have an oil factory there, though it unfortunately had to partially stop on account of the difficulty with regard to drying the fish-scrap for manure. They are obliged to empty a great part of the fish-scrap back again into the sea after extracting the oil. From what I know of the place I think that what General Laurie has said with respect to transferring the base of our naval position to Burrard's Inlet is of very great importance, and close in shore, I believe, there is any amount of water for our fleet. My friend has a pier running out there. He only has to run the net out and haul it in again, and he can catch any amount of fish. I may also say that there is coal at Burrard's Inlet. 200 miles of coal have been discovered on the Canadian Railway, in the Saskatchewan district up to the Rocky Mountains, and that is a very important point, because coal could come down that railway to Burrard's Inlet, and that would put Nanaimo out of the running altogether. The two points, however, which I principally wish to impress are, that we ought to be able to blockade both inlets with our fleet, and also I should

like to know whether the enemy could come up within this line, between the line as defined on the plan, and the American coast.[1]

C. Pfoundes, F.R.G.S., &c.: There is an important point that has only been briefly alluded to in this paper which I desire to say just a few words upon, and that is "Our relations with China and Japan." The chart exhibited being on the Mercator scale, to others than those who are accustomed to use that scale, it naturally very much distorts the northern portion of the Pacific, and we do not get a fair estimate of the very short distance from the Russian territory to our own on the Pacific coast. From knowledge gained during long residence in China, and especially in Japan, I think our connection with this latter country should be looked to as a most vitally momentous matter. I know, also, that many are very much more in favour of the Chinese, and the idea prevails that in certain parts of China a very much better class of men than we have can be found to act as seamen and firemen. At the same time, I think, some bond of unity with Japan, if our authorities could see fit to enter into a treaty of offence and defence against the Russians, would be of immense advantage. I have had very varied and not inconsiderable experience of all classes of the Japanese, and I believe they would make splendid auxiliaries, or allies, both ashore and afloat. A recent paper in the *Nineteenth Century* sounded a note of warning with regard to the weakness of our army; and I had the honour of reading a paper, with regard to our seamen, &c., at the British Association last year. I think that such a treaty would be of very great advantage, especially when we look at the geographical and political position of that country with regard to our North American territory. The Japanese would be very much more valuable allies than is generally supposed, having ample docks, machinery, &c., at disposal. I saw some 9,000 of our Gallic neighbours across the water in "durance vile" under the walls of Minden in 1870–71, and from what I saw during the struggle between France and Germany I am of opinion that we could get an equally valuable contingent of allies from the Japanese, who would be quite capable of giving good account of such a class of troops, should we ever be in trouble. I merely throw that hint out as an illustration of my opinion with regard to the value of the Japanese afloat or on shore. I know for myself what discipline they can be brought under, judging from how easily I managed them, single-handed, when getting them off in our own and chartered ships for the Formosan expedition, and what they can endure in the field, and with regard to bravery, cool courage, and dash, and everything that is necessary in the face of an enemy. Then we have to consider, also, the fact that Japan is a nation of nearly 40,000,000 of people, who have at their disposal, at the present moment, very valuable resources that we ought not to allow the risk of falling into the hands of an enemy; they have most important machinery, several large and well appointed docks and arsenals, and appliances at their command, and are likely to have some of still more importance, so that if we will only protect them from the Russians the day may come when they will be very valuable to us. I think by such an alliance, offensive and defensive, with the Japanese we should find an important and very *economical* way of almost *immediately* providing a *very valuable base in the Pacific*, while something else is being done in our own territories. It is hoping to draw attention to these matters and to "strike a key-note of warning" that I have ventured to intrude on the meeting, and to point out as one of the most valuable considerations for immediate study, that in case we are brought into contact with the Russians, or any other Power, or combination of smaller Powers, it is to the Japanese, rather than to the Chinese, that I think we must look for practical and immediate assistance, or rather co-operation for mutual defence.

Mr. Bryce, M.P.: I may perhaps be permitted by the meeting to say a word or two, on the ground that I am one of the few here present who have visited the places treated of by General Laurie. About eighteen months ago I was at Victoria

[1] Note.—The capture of Kinburn, Kutch, and Yenekali confirms the views of Major-General Laurie, Kinburn, chiefly taken in rear, Kutch and Yenekali taken in rear, the allies landing in a bay to the southward. The garrison escaped capture by retreating into the interior.

and Esquimalt, and therefore I may perhaps contribute a little to the information of the meeting. May I be permitted first to say that I very much admire the lucidity and force with which General Laurie has stated his case, and so far as my own observations go, I willingly bear testimony to the practical correctness of the account he has given both of Victoria and of Esquimalt? I quite agree with his view that Victoria and all that part of our dominions is rather to be looked upon as the pleasure ground of the Pacific coast, than as a region of great commercial importance. Anyone who sails from Vancouver's Island, as far south as San Francisco, and still further down to Old California, and observes how wonderfully exposed and wild all that long line of coast is, a coast almost destitute of harbours, and swept by frequent storms, will be struck with the fact, that when this part of the world becomes filled by an industrious and wealthy population, who will wish and will be able to afford to enjoy also the pleasures of life, the region to which they will resort for summer enjoyment will be the further end of Vancouver's Island and the inlets which form part of or issue from Puget Sound. The whole of that coast displays one of the most beautiful pieces of scenery that the world possesses. There are islands of various heights and sizes, generally richly wooded, furnishing admirable sites for villas and watering places; and the great stores of natural wealth which exist in the State of Oregon and Washington Territory warrant the belief that in thirty or forty years there will probably be a vast population living within easy reach of the coast; so that we may well expect that the number of pleasure seekers in that part of the world will be very great. From its situation and climate Victoria will be a spot specially attractive to summer visitors generally, as well as to those yachtsmen to whom General Laurie has referred; and it may become the Brighton or Torquay of the Northern Pacific. As regards the military or commercial future of Victoria, considering the extreme difficulty of protecting Esquimalt Harbour and the town of Victoria, and looking to the shallowness of the water, it is clear that it never will become a place of great strength or of great trade. Perhaps it really would be for the benefit of Victoria that the naval station should be removed from Esquimalt, and Victoria be permitted to extend itself over the inlet which separates it from Esquimalt, so that Esquimalt Inlet should become the commercial harbour. It is much better fitted for the purpose than the present port of Victoria. I conceive in that way a better future will be opened commercially to Victoria than it can aspire to at present, and at the same time it would have the advantage of being an open town and not liable to bombardment in case of war. The question of what would happen in case of war with the United States is fortunately a question which may be regarded as purely theoretical, because any Englishman who travels in the United States feels as certain as one can be of anything in the future, that hostilities between that country and ourselves are practically impossible; of course there are other Powers in the Pacific of which one cannot say so much. At the same time, I do not think we need feel any fear of such a contingency. Knowing something of the naval condition of these Powers, I feel perfectly certain that our navy could give a good account of them before they would reach this harbour. I have not seen Burrard's Inlet; but all that I have heard of it confirms the conclusion maintained in General Laurie's paper—that the best point for our naval stronghold would be that which is nearest to the terminus of the Canadian Pacific Railway.

Captain BEDFORD PIM, R.N.: Having spent several of the happiest days of my life in that neighbourhood, on board the old "Herald," I naturally take a very great interest in it now, and I take an interest in it not alone for that reason, but because I believe it is, strategically, of the very utmost importance to this country. I was very much struck with the concluding words of the gallant lecturer, in which he said that this question was a really Imperial one; and I must confess that I have never listened to any paper in this room more admirable than that of General Laurie. It is thoroughly well put together, and it breathes a good old-fashioned Tory principle from end to end, in a way such as I must confess has warmed my heart. I was very glad to find the gallant General has put his observations upon paper in such a strain as he has done. With regard to moving the strategical point from Esquimalt to Burrard's Inlet, I am hardly prepared to go with him there. I think that some of the ironclads that we have in our harbours, that are

not able to keep the sea, might very well be used at Esquimalt and Nanaimo, and also Burrard's Inlet if you like. I think that they will do all the work that is necessary to keep any one from landing. I quite agree that the position of the forts is simply absurd; we cannot call them forts at all. As the General pointed out, you will have to fire through the dockyard before you can touch an enemy approaching; that would be done away with if you had an ironclad there and used it for the purpose of defence, and also at Nanaimo. Burrard's Inlet seems to have admirable advantages for the terminus of the railway. I believe Sir Alexander Galt will tell us presently that the railway will be completed in 1885. I have a letter from the President of the Canadian Pacific Railway (who is going to show all sorts of hospitality to the British Association next year) in which he says that it will be, at all events, to the foot of the Rocky Mountains before that time. In relation to the transit itself through Canada, I may mention one point which the gallant General has not referred to, and that is this: that I think there will be a great deal more commerce go by way of that terminus than he has the least idea of. I hold in my hand a letter written to me so long ago as the year 1866, from the famous Commodore Maury, and he says if the line to China is continued on the great circle from San Francisco and back to Vancouver, you would take the winds with you both ways, and make extraordinarily rapid passages. Under those circumstances no doubt our communication with India and China will go by way of America instead of through the Suez Canal. It will be made very much quicker by simply having an outgoing route and an incoming route, because you carry favourable winds with you both ways. I remember taking special interest in this part of the world some years ago. I think it was in February, 1877, that I brought a question before the House of Commons with regard to eleven Russian vessels which were then lying in San Francisco Harbour, evidently sent there not for the purpose of attacking Turkish merchant ships or men-of-war, but to be ready, in the event of war being declared with us, to cut off our food supply. I dare say every lady and gentleman in this room knows that we get two-thirds of our food from abroad: and from San Francisco last year upwards of a million tons, not quarters, of grain came to this country. With light and active cruizers nothing could be easier than to cut that supply. Captain Semmes played havoc with the American merchant navy, and we all know it is very easy and simple to do the same with ours. We really have not the command of the sea at all unless we have fast and efficient cruizers ready to keep that command. Our ironclads, to my mind, are not worth much, and as to any cruizer that can convoy a number of merchant ships round Cape Horn, I do not know of one on the "Navy List" at the present moment. I think I have said sufficient to show that the paper of the gallant General is a most well-timed and useful one, and one that I am quite sure deserves the warmest thanks of this Institution. It is one really of Imperial interest. For my part, my only astonishment is that Canada sticks to us. I wonder that she does not throw us overboard at once; because if Vancouver and the terminus of the Canada Pacific Railway were attacked by only one small, active, light-draught vessel, it would play havoc with those different settlements, and who would have to pay the piper? Of course the Canadians. They would lose prestige, and altogether it would be a very bad thing for them. I hope that this discussion will prove to be a note of warning which will wake up some of our authorities in order that they may put this part of our possessions into proper order, and the sooner it is done the better.

Mr. FREDERICK YOUNG, Hon. Secretary, Royal Colonial Institute: Having been asked by the gallant reader of the paper to say a few words on this occasion, I have very great pleasure in doing so. I cannot of course approach this subject, which seems to me a professional one of great importance, from a professional point of view; but I may perhaps be permitted to make one or two remarks as a civilian. I consider it is a matter of great interest, that questions, such as I have had the pleasure from time to time of listening to in this room, on these and cognate subjects, should be discussed and ventilated here, because it enables us, the British public, to have our attention called to the fact, that we have very great interests outside the boundary of these islands, and beyond the "*silver streak*." I think it is of the highest possible importance that we should continually have our attention publicly drawn to the question, that we have great responsibilities, as well as great

and vast interests, all over the whole surface of the globe. We have had our attention drawn, in the very able paper read by the gallant General this afternoon, to a case in point. It strikes me that there are one or two important considerations to be borne in mind with regard to the best position for a harbour to protect our commerce in that hemisphere. In General Laurie's paper we have had our attention drawn, very properly as I consider, to the future. He predicts that we shall see an immense increase in our trade in the Northern Pacific as soon as the Canadian Pacific Railway is finished. We have also had our attention called to the history of the settlement of Esquimalt, which is a very remarkable one. It is an illustration of many of the things of this sort which happen in connection with the outlying parts of the British Empire. From very small beginnings, and for sometimes inadequate reasons, we fix on points of Imperial defence, as well as commercial settlements, in particular directions; and then, certain interests having been created, we keep developing them without having taken a sufficient and comprehensive grasp in the first instance, perhaps, of all which the future may afterwards bring forth. This is apparently the way in which the settlement at Esquimalt has been made. It certainly appears to me that very cogent arguments are brought forward in this paper to induce us to pause before we spend more money, which it is quite clear we must do if we continue to make Esquimalt the headquarters of our naval base of operations in that portion of the globe, in favour of transferring this base to Burrard's Inlet. No doubt the usual question stares us in the face of the cost of such transfer, but that question of costs is one of an Imperial character, ought to be incurred only in a way to produce the most valuable national results. The world, if it is not ruled by sentiment, is, at all events, very powerfully affected by it; and I am very glad to see that the gallant reader of the paper calls attention to the possible feeling which might be engendered among our fellow countrymen in Vancouver Island and Victoria if they thought that this fortified harbour and dockyard was to be transferred to the mainland and taken away from themselves. I think it is very important indeed that their feelings and sentiments should be thoroughly consulted, but at the same time I think the arguments that have been used in this paper ought to have considerable weight in reconciling them to any possible change which Imperial policy might dictate as desirable. Like my gallant friend on my left, Captain Bedford Pim, I cordially endorse the sentiments expressed in the last paragraph of this very able paper. I think the whole question is an Imperial one; and although I am aware that Captain Pim has a word in connection with politics, which I believe is not permitted in this room, I myself, while holding different politicial opinions to his own, hope I may be permitted to introduce a word, not of a party but of an Imperial character, and to say that I trust we shall approach all questions of this kind not from a Conservative or Liberal but from a thoroughly patriotic point of view. I will conclude by saying that I have had the greatest possible pleasure in listening to the very able and instructive paper which has been read to us this afternoon.

Mr. Stephen Williamson, M.P.: I am scarcely fitted to take part in this discussion, being unconnected with the special branch of knowledge that has been under discussion to-day, that is to say, connected with strategical operations. But I would, nevertheless, like to express the great pleasure and interest with which I have listened to the reading of General Laurie's paper. I know something of the Pacific coast, although not of the Archipelago before us, as I have not been so far north. I entirely agree, so far as I can understand it, in the necessity of the transference of our naval base from Esquimalt to Burrard's Inlet as against all our possible enemies except one. But the intricacies of that channel, and the contiguity of our territory to that of the United States, would make it, to my mind, an extremely hazardous speculation to say that we could hold Burrard's Inlet against the immense resources of that people, should we be ever unfortunately at war with them. I do not believe, as Professor Bryce said, that we have the remotest chance of ever being at war with the United States: and, therefore, as against all other possible enemies I do believe the transference from Esquimalt to Burrard's Inlet, if it can be done without a very great outlay of public money, would be a very good thing, and at any rate it is a question well worthy of being mooted and discussed. General Laurie has spoken of the new railway coming across to Burrard's Inlet, which we hope may be opened in two or three years' time. It must not be forgotten, however, that

besides the Central Pacific Railway to San Francisco there is also to be opened very soon a Northern Pacific Railway running into Puget Sound through the northern territory of the United States, and not very far separated, almost a competing line, with this one to Burrard's Inlet through Canada. The outlet in Puget Sound (which I am very sorry the map does not show), I think, runs in from Admiralty Strait, or near thereto. The resources that could be poured through that line from the United States into the Vancouver territory would be so enormous that any expenditure in Burrard's Inlet to make it an imperial and national affair worthy of consideration, that is to say with any possible contingency of war with the United States, would be money thrown away; for I am sure we could not hold it as against the United States. But I repeat that, looking at the extremely remote contingency of our ever being at war with our brethren in the United States, and to the much more likely contingency (although I hope it may be averted) of war with some other Powers, I should say that the transference from Esquimalt, which cannot be defended, to Burrard's Inlet would be well worthy of consideration.

The Hon. Sir ALEXANDER TILLOCK GALT, G.C.M.G.: I did not propose, Mr. Chairman, to appear here in any other capacity than that of a listener to the extremely able paper which we have heard from General Laurie, but as reference has been made to two or three other points by previous speakers, perhaps you will allow me to intrude for a few minutes. First, I may say, on behalf of Canada, I feel very much indebted to the General for the extremely able paper which he has read this afternoon. He has served in Canada for many years, and it is not by any means the first service he has rendered to us, and I trust it will not be the last. I will not for a moment presume to offer any opinion upon the strategic or military reasons set forth by General Laurie, but there is one thing which I think must be evident to us, namely, that the main question of protecting the terminus of the railway is the paramount one in the defence of that coast. If you lose the command of the Pacific Railway, the supply for your defensive operations on the Pacific coast is almost entirely gone. With the possession of the railway you have communication with Canada, and very speedily with England herself. I may just say one word with regard to the possibility of having to consider war with the United States. I quite agree with Professor Bryce in saying that the matter is one beyond all probability of risk. But this may be said, that if we should by any misfortune get into a war with the United States it is not in British Columbia that the attack is going to be made. What we have really to look at in this question is the defence of the naval power of England in the Northern Pacific Ocean. In Canada we are doing our very best, and will continue to do our best, to support the efforts of England to maintain the integrity of the Empire, and I cannot respond to the jocular invitation of my friend Captain Bedford Pim in saying that we ought to serve a notice to quit. On the contrary, I believe the interests of Canada are greatly promoted by her connection with this country, and instead of a desire to assume the feeble position we should necessarily be in as an independent country, at the mercy of the United States and every other great Power, I think it is much better for us to remain part of the Empire of Great Britain. I am quite sure that the discussion which has taken place must be gratifying to General Laurie, and I am equally certain that the views which he has given will be of very great service in the settlement of this question. The railway may or may not be finished quite as early as 1885, but it is quite clear it will be finished before the defensive works which are referred to are likely to be erected; therefore, the sooner the question is pressed upon Her Majesty's Government, and also the Government of Canada, and the sooner the two Governments look into the question of the defence of their mutual interests in the North Pacific, the better it will be; we are certainly much indebted to General Laurie for being the means of bringing the subject before the Government of this country.

Admiral Sir LEOPOLD M'CLINTOCK, F.R.S.: I think we can hardly overestimate the importance of the subject which General Laurie has brought before us; we know, and Sir Alexander Galt has also told us, the extreme importance of fortifying the Canadian Railway terminus on the Pacific, by means of which war material could be brought for our forces on that shore in about fourteen days, instead of going round by sea and occupying about four months in its passage. But what

I wish to bring prominently before you is, the absolute necessity of having our *one* coal depôt in the Pacific Ocean defended. We have but this one, and on it our fleet would be dependent for supplies, and also our trading steamers, in time of war. If we lose it we must relinquish our trade in the North Pacific; and if we lose our trade in that sea we lose just so much of our daily bread. I wish to emphasize the vital importance of fortifying our coal *depôt* out there, and of having our naval position, now at Esquimalt, capable of resisting an attack. We may at times temporarily lose the command of that sea, and if such an event should happen Esquimalt would be exposed to attack. I presume it is the intention of the Government, in the event of a war, at once to withdraw from Esquimalt; and I fully agree with General Laurie in the view that he takes of the great importance of having a fortified naval station at Burrard's Inlet.

General LAURIE: Mr. Chairman, Captain Curtis has expressed the opinion that the entrance to the straits is actually the key of the position. Unquestionably it is; but then, if the vessels are to go out there (*pointing*) to hold that, they must have a strong fortified base from which to work; and it is just that very point that I am trying to establish—that if the vessels go to the mouth of the straits, assuming that we were at war with an active enemy, and it is not likely we should be at war with anybody else, there is an opportunity for a hostile vessel to lie in neutral waters. If we were at war with the United States they have the power to come out from Puget Sound forts, and attack our naval base. If we were not at war with the United States, it is most probable that they would simply be neutrals, and their ports would afford harbours in which an enemy's vessel could lie in neutral waters, and whilst our vessels were out holding the so-called key of the position, Esquimalt would be at the mercy of that vessel. It is for that reason I want to put the dockyard where it would be safe, where it can be guarded by such forces as we are likely to be able to furnish to protect it. There is no doubt that in time of war, if the United States were neutral, we should have trouble. The strongly marked line shows the boundary between the United States and the British possessions; but I believe an enemy lying within three miles of their coast would be in so-called neutral waters, and there are plenty of harbours in which a vessel could lie and shelter till an opportunity offered to strike a blow. Captain Curtis referred to the fact that coal has been discovered at Burrard's Inlet. No doubt there is coal there, as the cove near Dashing's Mills is called Coal Harbour, but with reference to the coal being brought down from Saskatchewan, that might be very valuable as a last resource, but coal that is to be brought 600 or 800 miles would be very expensive by the time it reached the terminus, and as long as you can get coal at Nanaimo, three miles from a shipping point, it is much more advantageous than having to go over the Rocky Mountains for it, but of course it is a capital thing for Canada that we have that coal up there in those plains where wood is scarce.

Captain CURTIS: I spoke of coal with reference to the railway.

General LAURIE: I was speaking more with reference to the ship supply. With reference to Mr. Pfoundes' remark as to China and Japan, I would only say I do not desire that we should fight with any particular nation; I hope we may remain at peace with all the world, but at the same time the inference from our keeping up an army and navy is that we do expect at some time to have to use it; therefore we naturally look round and see who our probable and possible enemies may be—those who are likely to be brought into contact with us, whose interests are likely to come foul of our own, and therefore who we are likely to quarrel with. I hope we shall have no fight there, but I cannot help thinking that the Pacific will more than probably be the scene of the next great naval contest. That has been my opinion for years past, and hence my anxiety to bring this question into notice. With regard to the relative power of England in the Pacific, it is all very well to say that we have the command of the sea, but though we may have the largest number of vessels afloat, it does not follow that we have a superior number in the particular place where they are wanted, and our position was not so satisfactory a few years ago when we had to take a wooden frigate and try and make a Peruvian ironclad behave itself. I do not think that Admiral de Horsey would care to repeat that experiment more than he could help. Not only that, but the photographs I have seen hanging up in the various houses in Victoria of the "Shah" with her bows out of the water in order

that the shot holes might be filled up, did not give one the idea that we had the command of the sea and had it all our own way. With the enormous interests we have to protect, it seems almost impossible for us to maintain ironclads sufficient to deal with opponents wherever trouble may arise, and I must say the reference Captain Bedford Pim has made to the fact of a squadron of eleven Russian vessels lying in San Francisco at one time shows that numerically we had not a preponderance of power in the place where it might have been very important to us that we should have it.

Captain BEDFORD PIM: Over all the Pacific at that time we had seven ships.

General LAURIE: And some of them are perhaps not as first class as we should like!

Captain BEDFORD PIM: They averaged seven knots—the whole of them.

General LAURIE: With regard to the suggestion that we should send out some of our old ironclads to protect the Esquimalt Harbour, if they are not fit to keep the sea I do not know how they would get round Cape Horn.

Captain BEDFORD PIM: They would be nursed round.

General LAURIE: The enormous increase of commerce that may be expected when the railway is finished gives, to my mind, an additional reason why we should strengthen our squadron on that station. With regard to the cost of moving the yard to Burrard's Inlet, I fancy anybody looking at that yard would see that the expense attending its erection was not very great. Really the cost of the buildings is almost nominal, they are simply wooden sheds. Mr. Williamson thinks we could not hold Burrard's Inlet against the United States. Of course that raises the larger question which Sir Alexander Galt has put in another shape, whether we could hold Canada at all against the United States. Some of us think we could; at any rate, Canada has made up its mind to try, and the people most interested in the matter, the Canadians, have determined to throw in their lot with England: and if such an unfortunate occurrence as a war with the States should happen, the Canadians intend to keep the old Union Jack flying, and to protect it as long as they can. And I fancy what applies to other parts of British North America will apply to British Columbia, small as the population there is. It is quite certain the important fight would not be in British Columbia, but at the same time there would naturally be an effort made to destroy our naval stores there, and it seems desirable, to my mind, that they should be placed in the most defensive position, where they could best be protected, and if they can be placed where they can only be attacked on one side on a very small front, where they cannot be approached by the rear. We are reminded, on a somewhat larger scale, of Leonidas and his 300 Spartans, how they held the narrow-fronted pass of Thermopylæ against untold Persians. You must recollect the thing is to hold out while the ships are absent, to hold it temporarily, not permanently; and I believe that could be done if the garrison had the proposed advantages of defence. It is not settled yet where the Northern Pacific Railway is to strike Puget Sound. The fact of that Northern Pacific coming in behind Esquimalt, as it were, higher up the Sound, so that any expedition prepared at the terminus of the Northern Pacific would pass to the upper side of San Juan Island, and would pass direct to Nanaimo without being exposed to an attack from Esquimalt in passing, puts us at present in the false position that, even although we have the command of the sea, we still might have our coal depôt at Nanaimo burnt. That is why I am anxious we should establish ourselves at Burrard's Inlet, and there we should be able to attack any expedition in flank. Of course the coal is everything, as Sir Leopold M'Clintock pointed out. Sir Edward Selby Smyth, who formerly commanded the Militia in Canada and who visited this province, strongly recommended that a nucleus of regular troops, in the shape of a small body of marines, should be maintained at the naval station wherever it may be; but a small body of marines at Esquimalt would be simply placed there to be gobbled up by the first cruizer that came along. But placed at Burrard's Inlet they have a much better chance of holding their own. Captain Colomb has so lately lectured in this theatre on the subject of the employment of marines and the wonderful way in which their organization fits them for this very work—detached Colonial employ—that it almost seems as if the two subjects fitted in together. I am sorry he was unable to come here to-day, because he brought up that subject, mainly with the view of showing

their capacity for Colonial defence. I must thank all present for kindly attending to-day to hear this, my maiden effort in the shape of a paper on a technical subject, and for the kind way in which you have encouraged me to believe that my remarks have not been altogether thrown away.

The CHAIRMAN: It only remains for me now to offer, in your name, our very best thanks to the lecturer for the extremely able paper he has read to us this afternoon. He has called our attention to the fact that our naval establishments abroad require to be efficiently and adequately protected, and that in the North Pacific our naval station is no exception to that general rule. And I venture to think, though I speak with diffidence on the question, that he has shown very good and sound reason for the position that he has recommended for our naval establishment. Of course these matters are always open to consideration from various points of view, but I sincerely hope that this lecture will meet with its merited consideration from those who are responsible for the defence of the country.

Friday, April 13, 1883.

VICE-ADMIRAL W. G. LUARD, C.B., President, Royal Naval College, Greenwich, in the Chair.

ON COALING SHIPS OR SQUADRONS ON THE OPEN SEA.

By Lieut. R. S. LOWRY, R.N.

Read by Lieut.-General LOWRY, C.B.

The CHAIRMAN: The author of this paper is serving on the Australian Station, in the "Espiègle," and his father, General Lowry, will read it to us.

General LOWRY: I must ask the kind indulgence of my comrades of the sister Service if, in putting before them the contents of my son's paper, I prove that I am myself somewhat "at sea" on the subject. That subject is important, and I trust its treatment and discussion to-day may be productive of some good to the public service.

SOME apology is due from one like myself, without much practical experience in it, for writing on the above subject. It is solely in the hope that far abler hands than mine may be induced to take it up that I venture to touch it. Nevertheless, its vast importance, and the need for its full consideration in every detail before the outbreak of a naval war, has been strongly impressed upon me both by the careful study of able articles from British and foreign pens, and from a recent personal experience of the difficulties to be met when coaling where proper appliances for doing so are not to be found.

Few will deny that the mobility of our ships and squadrons, their usefulness, and to use a slang, but very expressive term, their "staying powers," would be vastly increased if some effective plan were found for coaling at sea.

I think I am within the mark in stating that during the blockade of Charleston by the Federal fleet, nearly one quarter of that force were always absent from before the port, employed in filling their coal-bunkers.

During the same war Federal cruizers while searching for the "Alabama" were constantly obliged to quit that portion of the ocean allotted to them, in order to fill their bunkers after one or two useless chases of suspicious-looking vessels. But those who have read the various able papers on the different branches of Naval War published in the Journal of this Institution, cannot fail to have been struck with the necessity which must so often arise of replenishing coal-bunkers at times when it would be most detrimental to the service on which the ship may be employed, had she to proceed to the nearest friendly port for that purpose.

To quote a few writers in support of this opinion—

Captain J. C. R. Colomb, R.M.A., in his able paper on "Naval Intelligence and Protection of Commerce in War," states that—

"We have in maritime war to provide for three great naval operations:

"1st. Blockade of the enemy's coast.

"2nd. Securing the ocean routes of the world.

"3rd. Coast covering operations off neutral seaboards to provide safety for our commerce between such seaboards and the ocean routes."

Dealing with (1) on Blockades—

Captain S. Long, R.N., in his paper on "Naval Blockades as affected by Modern Weapons" (which unfortunately I have not by me at this moment, and so am unable to quote *verbatim*), lays it down as "absolutely essential to the maintenance of an efficient blockade that the blockading fleet should be within easy reach of their base, or at least seize some island near at hand from which coaling could be easily carried out."

Provisioning is, of course, equally essential, but all ships can carry provisions for three or four months, few could stow coal for as many weeks, especially if false alarms or chases cause full steam-power to be used occasionally. Could the fleet be kept supplied with coal by steam colliers and this transhipped while lying off the port, the numbers of ships in it might be reduced, the coal would last longer (that consumed on passage to and from the base of operations being saved), and the arrangement of reliefs would be greatly simplified.

Of course the advantage of such an arrangement would be more felt in the blockade of ports distant from our base, such as Toulon, Rochefort, Cronstadt, or New York, than in ones close to a coaling station of our own, such as Cherbourg, Jahde, or Portland (U.S.A.).

(2) and (3) may be dealt with together, for cruizers employed off neutral seaboards would be unable to obtain their coal from neutral ports, and would depend on British colliers for their supply, hence they would come under the same category as the cruizers employed on the great ocean routes.

Captain Colomb, in the before-mentioned paper, has told us how, by the proper working of a Naval Intelligence Department, the Captain of a cruizer (whether our own, or the enemy's) might know where to lie in wait for any number of British colliers carrying coal to neutral ports.

As yet we have had no practical solution of the difficulty of transhipping this coal in average Atlantic weather on the open sea.

Sir T. Brassey, K.C.B., in his work on "The British Navy," says: "The limited supply of coal is a most serious defect in English vessels of the older types." He gives the coal endurance of the "Inconstant" at $2\frac{1}{4}$ days, and of the "Shah" at 4 days full speed steaming. Of what use would either of these ships be after steaming easily into the centre of the North Atlantic, perhaps having had steam ready for full speed at daylight on 10 successive mornings, if called on to carry out a protracted chase?

Captain Scott, R.N., in the discussion on Sir T. Brassey's paper on "Unarmoured Ships," read at the Institution of Naval Architects, Session of 1876, states: "I think, moreover, that you require, if you have groups of squadrons, somewhat equal coal-carrying power, or *means of coaling at sea which we have not yet hit upon.*"

Had I the back numbers of the Journal by me, I believe many other and similar opinions might be quoted from its papers and discussions, all tending to show the importance of this subject, and the small amount of consideration which it has as yet, apparently, received.

Those who served in the Channel Squadron in August, 1870, will well remember the delay of that squadron for nearly a day between Lisbon and Vigo, the hard work, the damage done to boats, the great part of a day occupied, and the risks incurred whilst endeavouring to supply Her Majesty's Ship "Captain" with some 50 tons of coal from the bunkers of two other ships. I have neither logs nor journals by me now, but if memory serves me right, in fine weather, and the boats of a large fleet available, only 30 tons were transhipped in about six hours (enough for two days' moderate steaming), *and this coal was mostly wet*, through being carried in open boats unprotected from spray. To avoid risk of foundering the boats had to carry but light loads; the time occupied being of course lengthened by the fact that steam launches were at that time less common, and less easy to hoist out in a sea-way than now, so that most boats were worked under oars. When lying alongside, of course the greatest care had to be taken in sending boats off, and during the six hours many narrow escapes from serious injury or total loss were run by the boats. Of course it is much more difficult to transhipcoal from the *bunkers* of one ship to those of another, than it would be to do so from the *hold* of a collier, but as labour power was practically unlimited in the ship's filling bags, this did not materially retard the rate of transhipment, which appeared to be affected solely by the difficulties of water-transport.

In the most perfectly calm weather most serious risk of injury to the lighter fittings on a ship's side would be run by attempting to allow the collier to lie alongside, and on 99 days out of 100 in the North Atlantic, this would be impossible. In most ships ample numbers of hands are available for the work of filling, emptying, transhipping, and hoisting coal, the great difficulty is how to get it over the intervening water space between collier and ship, with safety and rapidity, keeping the coal dry. It would also be a convenience if the coaling could be carried out without entirely stopping the ships, say, under easy steam of 4 or 5 knots.

At present the only available appliances seem to be the boats of the ship and of the collier, the coal itself being carried in bags.

Unless supplemented by an extra supply in the collier, the complement of coal-bags allowed to men-of-war, which is about 5 per 100 of indicated horse-power, would rarely be sufficient to allow coaling to be carried out in ordinary ships' boats without delay from this cause. Recently when coaling the sloop in which I am now serving

in one of the South Pacific Islands, only the cutter and steam cutter (without engine and boiler) were used in bringing the coal off from the shore; the establishment of coal-bags (71) was insufficient to load both boats, and the time occupied in coaling was nearly doubled from this reason, the working parties both afloat and on shore being frequently obliged to wait for each other. Ordinary ships' boats and bags utterly fail to keep the coal dry in any lop of the sea or rain.

This plan, too, is quite impracticable in a fresh breeze, and even in moderate weather entails much risk of foundering on the boats employed; the stoppage of the fleet or ship is also necessary.

Any satisfactory means of coaling at sea ought apparently to satisfy the following conditions:—

(1.) *Rapidity*.—Nothing short of 20 tons per hour for an ironclad if hoisting overall, or 40 tons if she has several ports that can be worked for coaling, or 15 tons in a small vessel, ought to be considered a satisfactory solution.

(2.) *Safety*.—The coaling must be capable of being carried out in any breeze in which ships' boats not heavily laden could carry working parties to and fro with facility. The boats or coal-carriers employed must be safe from sinking even if accidentally filled or injured in transit.

If any form of pneumatic or other tube is used as a coal-shoot between the ships, it must allow of the ships being at least 20 yards apart if steaming through the water, or 100 yards if both are stopped. It must also be very flexible to allow for the motion of the ships.

(3.) *The coal must be kept dry* to avoid danger from spontaneous combustion, and deterioration while in the bunkers.

(4.) *The coal-carriers or boats ought to be such that they can be towed alongside the ship from the collier while both are going at a speed of 5 knots.*—Owing to the particular service on which they are ordered, it may be most important not to stop the ship or fleet entirely. With a large squadron, the capacity of whose bunkers may vary greatly, one ship may require coaling much before another, and it may be inconvenient to stop the squadron, or risky to leave one ship behind, let us say in the supposed vicinity of an enemy's fleet.

(5.) If boats are used, they must be such as can be conveniently hoisted at the collier's davits; if some other form of coal-carrier, they must be such as can be conveniently stowed in the collier's hold or on her decks.

(6.) The minimum of labour should be required for filling, hoisting, or emptying them; they must therefore be of minimum size and weight for the amount of coal they carry.

(7.) Without being too expensive, they must be of strength and durability enough to stand considerable knocking about at sea and on foreign stations.

On studying the above conditions, it appears to me that they cannot be satisfactorily fulfilled by any ordinary boat carriage, but that they could be by means of some form of water-tight coal-carriers, and possibly by a pneumatic tube connecting the vessels. This latter proposal I do not feel myself competent to work out in detail.

In both, the practical working and the amount of coal carried, would be immensely facilitated and increased if, for ocean-coaling, some form of patent fuel were used.

Taking the conditions *seriatim*, let us see what qualifications the "coal-carrier" must have to fulfil them.

(1.) *Rapidity.*

(*a.*) The "carrier" must be of such a type that it can be filled, closed, opened, and emptied at least as fast as an ordinary coal-bag, *i.e.*, 10 men in a commodious hold ought to be able to fill 8 tons in an hour.

If the carrier is formed of some hard substance, as iron or wood, it will not require one man to keep the mouth open as in filling canvas bags, hence a gain of nearly 30 per cent. in labour when filling. The top should close easily and make a water-tight joint, the carrier either turning over or the bottom opening mechanically in one motion. The carrier must be of such a height and shape as to be readily filled by means of shovels, and not be more than 3 feet high. The coals should fall out on the deck by their own weight.

(*b.*) It must be of such a form as to be easily towed, therefore not too bluff at the ends, and the slings and towing spans so formed that a long series of carriers or a continuous stream could be kept going between the collier and the ship.

(*c.*) It must be of such weight as to be easily hoisted inboard by the yards, coaling ports, or derricks; for this purpose $1\frac{1}{2}$ tons might be taken as the limit of weight for each filled carrier if to be hoisted at the yard-arm, or a $\frac{1}{4}$ ton for very small ships or coaling ports.

(*d.*) The slings must be so made as to be readily hooked on in a tumbling sea with the ship moving 5 knots; for this purpose the upper ring of slings must be fitted to stand up rigidly, and be about 1 foot in diameter, so that a large hook could be readily guided into it. This hook must be such that it will not come accidentally unhooked if the carrier be suddenly lifted by the sea; some form of spring like that fitted to a watch-guard hook would answer this purpose.

(*e.*) The towing arrangements must be such as can be readily slipped without the necessity of a man going into the water, or on to the carrier for that purpose.

(*f.*) The carrier must be easily closed, hoisted out empty, and returned to the collier for refilling.

(2.) *Safety.*

(*a.*) The carrier must be water-tight and carry a sufficient quantity of air in a compartment separate from the coal to ensure its flotation, even if the coal gets flooded.

(*b.*) Strength sufficient to protect from injury in case of striking bolts, &c., in the ship's sides.

(*c.*) Slings, both towing and hoisting, of ample strength.

(3.) *Coal to be kept dry.*—This entails water-tight joints for all openings in the "carrier."

Nos. 4, 5, 6, and 7 must be dealt with when considering the forms of coal-carriers suggested, but convenience of stowage renders it necessary that the rigid ring for hoisting should fit into some form of countersunk hole for stowing away, and that the angles of the carriers are such as to fit into each other when several are stowed together, in such a manner as to avoid having empty spaces left between the carriers.

It would greatly expedite the coaling of small ships, and to a less extent of larger vessels also, if the first 100 tons at least could be stowed in the carriers before the collier leaves port. I am aware that by doing so some space will be lost and considerable expense incurred, but during *war time* it is often of invaluable importance, and by wasting it an opportunity may be lost which perhaps will never recur. A vessel in the act of coaling, her decks lumbered, and with perhaps many of her men in the collier, must be looked on as almost useless for the time: if an enemy be then sighted, some delay must occur before chase could be given. Again, all coal must be stowed, and the ship ready to clear for action before nightfall, or a heavy squall or fog may come rapidly on, in which it would be most dangerous to be towing hawsers, carriers, or boats: hence, even a few hours' or minutes' delay in coaling at sea is a thing to be avoided; it ought to be made an evolution, well thought out and systematically arranged for beforehand.

If it were possible I would stow coal with as much care as provisions, every hundred-weight in its own case. That this is not an impracticable suggestion may be inferred from the fact that all the coal sent out from England to a mercantile firm in Brass River on the West Coast of Africa a few years ago (and for all I know still is) came in 5 cwt. wooden casks perfectly water-tight. Her Majesty's ship "Pioneer" when coaling used to tow these alongside, and hoist them inboard. In this case the casks of coal were not intended for use aboard ship, or in any very large quantities, and some delay was occasioned by the want of properly fitted towing and hoisting slings, and by the time taken in starting the hoops and wooden head.

All this would be obviated in carriers specially made for the purpose.

The best form of these carriers and the details of their construction would probably be more effectively dealt with by a mechanical engineer than by a naval Officer. As in the question of ship construction, I imagine that it is far better for us to state definitely what we require, and leave those who have made such subjects their life-long study to meet our requirements as nearly as they can. Nevertheless, I think it is well to give a rough sketch of a coal-carrier which will meet *some* of the requirements, leaving it to cleverer heads to work out, develop, and mature the idea.

While considering the coal-carrier, I have suggested but a very inferior one, and hoping that it may lead to the proposal of a far better one, let us see how it will meet the requirements laid down.

(1.) *Rapidity.*

(*a.*) The carrier can be filled quickly, as it stands only 3 feet high, the door is large enough for three men to work together at, and the coal falls by its own weight into any part of the box.

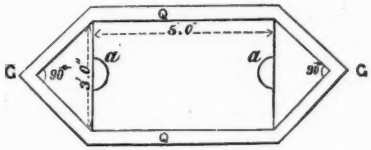
It can be closed quickly by half a dozen turns of three screws, which make the joint water-tight.

To empty it, the catch slips which hold these screws can be knocked off with a hammer, the side opening outwards from the hinge below the air-box, and nearly all the coal falling out by its own weight, the remaining small quantity being easily tilted out.

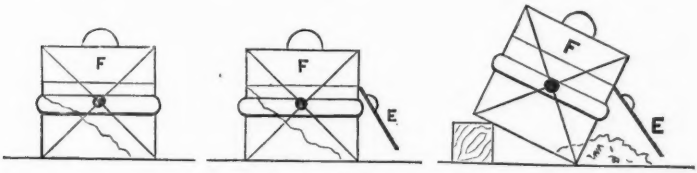
(*b.*) Facility of towage.

CARRIER. PLAN.

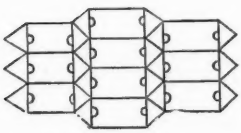
Largest size to carry one ton.
Weight of case $1\frac{3}{8}$ tons when filled and ready for hoisting out.



Semicircular or half rings at *a*, and lying flat in countersunk holes for stowage.

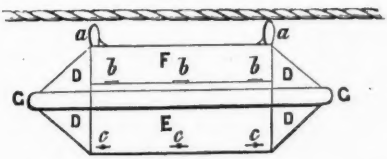


F. Air chamber. E. Door.



Method of stowage in hold of collier.

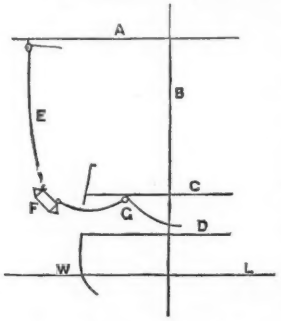
Towing hawser.



Side view.

a. Half rings standing up and keyed there.
b. Hinges to door.
c. Fastenings to door.
D. Coals.
E. Door.
F. Air chamber, 15 cubic feet.
G. Cork pudding, 2 inches in thickness.

Method of hoisting through coaling ports.



A. Lower yard.
B. Mast.
C. Upper deck.
D. Main deck.
E. Yard tackle.
F. Carrier.
G. Gurnet tackle.

The pyramidal ends ought to oppose but a small resistance to the water. If specially prepared strops and toggles (with laniards) are used on the towing hawser, any number of carriers could be fast to the same hawser at very small intervals apart.

(*c.*) The sketch and dimensions given are for the largest sized carrier proposed with a weight of $1\frac{3}{8}$ tons when full. Probably one of half the above dimensions, carrying half a ton of coal and weighing $\frac{3}{4}$ of a ton when full, would prove most convenient for ordinary service.

(*d.*) Ease in hooking on the hoisting tackle to the slings seems ensured by the semicircular ring one foot in diameter, and, when keyed, standing rigidly up.

(*e.*) Special strops on the towing hawser, with well greased toggles and loops attached, ought to be easily slipped with a boat hook, or by hand when the carrier is lifted out of the water.

(*f.*) The empty carrier can be hoisted out at least as quickly as the full one.

(2.) *Safety.*

(*a.*) The air-box proposed is sufficient to support the weight of carrier and coal if made of the size proposed, even if the coal gets flooded.

(*b.*) Strength. If made of $\frac{1}{8}$ in. steel, or $\frac{3}{16}$ in. iron, and protected by a cork "fender" or "puddings" round the centre and angles, it ought to stand all ordinary rough usage.

(*c.*) The rings for slings can be made of any desired thickness.

(3.) The coal ought to be easily kept dry, for there is only one opening to the case, and that is flat and oblong, long but narrow, so that it could be easily rendered perfectly water-tight when screwed well home to an india-rubber seating.

(4.) As the carriers are water-tight and sharp ended, they can be towed alongside the ship at any moderate speed.

(5.) The ends of the carriers forming a right angle, they can be stowed close against each other as shown in "plan of stowage."

(6.) This depends mainly on material used and workmanship in construction.

(7.) The carrier proposed does not seem to be very expensive, as it can be kept in store or in use for years, and is available for any class of ship.

In conclusion, I must warmly disclaim any idea of having solved this question, but I do hope that, having brought its claims and its importance forward, those who have time and talent will not rest until it can no longer be said that "we have not yet hit upon a means of coaling at sea." It may be long ere some apparently perfect plan is proposed, but in the meantime any fairly good one is better than none.

Let us follow the old "Excellent's" motto, "Si vis pacem para bellum," and in coaling as in the greater and more attractive subject of gunnery, let our motto be, "Ready, aye Ready."

General LOWRY: I sent a copy of this paper to Captain J. C. R. Colomb, R.M.A., for any remarks he might desire to make on this occasion. That gallant Officer is so well known to members of the United Service Institution as one of large views and well thought out and matured opinions on most subjects coming under his consideration, that I venture to ask the Chairman's and your permission to supplement the paper you have heard, and open its discussion by reading Captain Colomb's remarks on it:—

"Having through the kindness of General Lowry had the advantage and pleasure of reading the valuable paper by his son, Lieutenant Lowry, R.N., 'On Coaling Ships or Squadrons on the Open Sea,' I wish to express my very great regret at being prevented from attending the lecture in person, and taking part in a discussion which I hope may be worthy of the very important question with which the lecture deals. I should wish to take this opportunity of congratulating the Naval Service on the fact that this paper gives evidence that young naval Officers, as represented on this occasion by Lieutenant Lowry's paper, appear to grasp boldly problems which maritime war will certainly present for England's solution, and it is therefore gratifying to note them treading worthily the path of their distinguished seniors in the Service. It is, I think, hardly correct for the writer of the excellent paper to state 'that cruizers employed off neutral seaboards would be *unable* to obtain their coal from neutral ports' in war; I think both international law and custom, established by precedent, will entitle the war-ships of a belligerent to obtain from a neutral, without any infringement of neutrality, sufficient coal to enable the war-ship to proceed to the nearest port belonging to her flag. There are limitations as to time, &c., which I need not now allude to. But this fact really enforces the importance of the question raised in this paper. Because, as I have elsewhere often pointed out, this international law or custom must in the nature of the case operate to the disadvantage of England when engaged in maritime war, because England has ports on every sea and in every quarter of the world. For example, suppose a war with Russia. Say in the Pacific a Russian war-ship, followed by a British war-vessel, comes from the southward—both with exhausted coal bunkers—to San Francisco. The quantity of coal allowed to the Russian war-ship would be calculated by the quantity of coal she would require to cross the ocean to her nearest port, Vladivostok, while the British supply would be measured only by the quantity necessary to take her, as it were, round the corner, to Esquimalt. Now, with bunkers full, the Russian war-ship may go south to prey on our commerce; the British war-ship *must* go north if she is once more to become efficient by having her bunkers filled. I take this example as not merely a possible, but, I think, a very certain description of what will very likely happen during maritime war, and I select the Pacific because it is the ocean on which the author of the paper is serving. Next to the defence of our fixed coaling stations, comes, I think, the question (excellently and most modestly) raised by Lieutenant Lowry, and there-

fore, in the interests of the protection in war of our huge mercantile marine, I trust the paper will attract the serious attention it deserves. In the example I have given, our risks and dangers could only be obviated by coaling the British ships at sea beyond the neutrality limits of San Francisco. I can see grave mechanical difficulties must be overcome, but I entirely agree with the writer, 'that it is far better for naval Officers to state definitely what they require,' and I feel sure that if it be possible for mechanical contrivance to overcome the difficulties presented by the requirements of the Naval Service, those difficulties can and will be overcome by that pre-eminent engineering skill which England possesses."

The CHAIRMAN: It is now my duty to call upon any of those gentlemen who wish to take part in this discussion.

Admiral SELWYN: I recognize with great pleasure the very clever and well thought out attempt at the solution of a great problem which has been put before us. Unfortunately, there is no doubt whatever that the necessities of the case have confined us down to a most unsatisfactory quantity of fuel on board steamers at sea. It is all very well to say that you can go at low speed for a long time; but that depends on what your adversary thinks about the matter, and it will never be satisfactory to my mind until what I think I see in the near future takes place, when thirty days' fuel can be carried at sea for full steam power; but that we have not got yet. I think it will not be a year before you do get it. But the problem of how to coal at sea is one to which I, too, have paid some attention. I am not going to bring forward my own ideas against Lieutenant Lowry's, but simply to examine what are the difficulties which must stand in his way. He has, in my opinion, thought out the matter as closely as any man could possibly do, nor do I recognize anything about the whole plan which might not be accepted or fathered with pride by any engineer in the kingdom. He has considered the space, the expense, the mode of action, in a way that very many engineers could not have considered it, not having the experience at sea which is necessary to do so. But there is still the difficulty that, to do this, you must stop your fleet, or bring them down to a very low speed, which is undesirable. I think it can be done without interfering with the speed of the ship at all. Then he has got a great number of rather expensive coal cases to be carried in colliers, which, as he says, add considerably to the expense and to the space requisite where he introduces air-chambers, as he necessarily and very wisely does, and this comes out simply as a matter of money. It costs so much more money per ton of coal put on board the ship. Now, to some persons that would be a very serious objection; but to my mind, there is no price of fuel whatever that can be thought of for one instant in comparison with the efficiency of our fleet. If that be fully secured, then neither the nation nor the Government ought to find fault with the expense at which it is done. But as our preparations in the Navy must be continuous and permanent, it seems that you would have invariably to carry these cases when they were not required. Now that I regard as rather a more serious difficulty. They must be on the spot. You may get coals, for instance, from several of our Colonies. Can you expect these chambers to be always supplied to the colliers at the coal mines? I think there is something to be thought out there, as to how it would work, which must lead people to consider afresh the whole subject, and to weigh that difficulty in comparison with other difficulties belonging to any other system. But after all, gentlemen, good as this plan is, excellent as I believe it would be in practice, as Lieutenant Lowry proposes, prevention is very much better than cure. Let us turn all our attention, as it has not been turned, I am sorry to say, to those means which may enable us, first, to economize our fuel. For the last fifteen years there has been steadily put forward a thing which is now succeeding admirably well in private hands, in which only 1 lb. of coal per indicated horse-power is required instead of 2½ lbs. That is the first thing to be considered, before you consider what you will do with the coal after you have got it in your collier. The reason why I ceased to turn my attention so strongly in this direction as I had done previously, was that I am absolutely confident you are going to see the end of coal for steam fuel at sea altogether. It will not pay to take coal on board ship at this moment. We have not done much in the matter since I first attacked the subject some years ago, but the Russians, I am happy to say, are finding out the

value of liquid fuel, and when you get liquid fuel, I need not tell you, all these difficulties of passing it from one ship to another will very materially disappear. I have said everything I can in praise of Lieutenant Lowry's plan; I think it very good indeed for our present necessities, but I trust to see those necessities largely abolished in the future. I am quite sure that if half the attention were given to this subject which has been given to the guns, which are utterly useless without the power to carry them about, we should long ago have seen a solution, and a satisfactory one. I believe that it is the practice to refer these matters to Committees. Now on that subject, I heard a very clever dictum, coming from a curious kind of authority, which I may repeat. Mr. Moody, of Moody and Sankey, appears to have been plagued, I do not know whether in his musical or religious work, by Committees, and he at last brought out a piece of concrete wisdom, which I commend to the serious attention of every Englishman: "If Noah had had a Committee, the Ark would never have been built."

Captain BEDFORD PIM, R.N.: The gallant General commenced by saying that he was somewhat at sea in reading this paper. I am sure you will agree with me that, had the son been present, he could not have done more justice to the paper than his father has done. It is seldom one hears a paper more admirably read. I think I should be disposed to attack this subject from a different standpoint altogether from that which Lieutenant Lowry takes. I do not quite understand how he could transport this coal from one ship to another, especially in these days of long ships, when the collier would be rolling, gunwale under, on the slightest possible provocation. But I think I should attack it in this way. Sir E. J. Reed told us, many years ago, that an ironclad could be built to sail as well as steam, equal at all events to the fine old wooden frigates, &c., of the past. Now, we know that no ironclad is worth much at sea under sail. Why do we not build ships that will keep the sea under sail, the same as the ships of our forefathers did, as long as the provisions lasted? There is no difficulty about it. It seems to me the coal question would then be solved. If you had ships, from gunboats up to ironclads, that could keep the sea under sail as long as their provisions lasted, you might save your coal, and only use it to draw off a lee-shore or engage an enemy. Then you would have no necessity to coal a ship on the ocean, which I, as an old-fashioned seaman, am afraid is altogether impracticable with even a light sea on. I do not see how you are going to coal a ship in mid-ocean. You may transfer a small quantity on an emergency, but nothing more. With regard to international law, all the coal you are allowed from a neutral port in time of war—for coal is a contraband of war—is just enough to take you to your next home port. Well, as Captain Colomb has pointed out so well in the letter which he has written to General Lowry, on the Pacific coast it would be a very serious matter indeed. We could only take coal on board sufficient to take us, say, from San Francisco to Esquimalt, 600 miles, while the Russians would be entitled to sufficient to take them to Vladivostok, several thousands of miles from San Francisco. I do not mean to say that the Russian men-of-war would avoid going to Vladivostok; but, supposing they did, and turned back and fell on some of our so-called cruizers, it would not be pleasant, but rather a serious matter. But I think this difficulty with regard to the Pacific might be solved in this way. There are some islands, which I was employed in surveying some years ago, the Galapagos. They would make a splendid coal-depôt. Why do not the Government, for a few thousand pounds, buy the Galapagos, where you might have anchorage in the smoothest of water and render the coal depôt impregnable, and take your ships in any time you please? No more central place could be found on the Pacific station, and nothing would be easier than to turn them into a large coal centre. I am afraid that if you rely upon Esquimalt in the event of war, you will rely upon that which will fail you. I hope that some of the younger Officers will take up the thread of the argument and give us the opinions they entertain of coaling an ironclad on the open sea.

Captain NOEL, R.N.: I have only a few remarks to make on the paper. I think Lieutenant Lowry deserves very great credit for bringing this subject before the Institution. I am very much impressed with the manner in which his plans have been worked out, and I think them deserving of a great deal of credit as a bit of engineering. There is no doubt that this subject is one of the very

greatest importance; our ships of war must be limited in their coal capacity, and therefore we shall suffer if we cannot get coals under certain circumstances. Economy of coal is the question of the day, or it will be, when we go to war; and if we can economize coal by any other means, such as by use of sail power, so much the better. I am going to read a paper here shortly on the sail power of ships of war. I consider it essential for all cruizing vessels that they should have some other means of propulsion besides steam; still such other means of propulsion is only to assist in economizing fuel. Here we have a means of facilitating the supply of fuel. Of course we must be continually coaling, and I quite think we ought to find out a way of coaling at sea for several reasons. In the first place, in a severe war we may find that the coaling stations that we reckoned so much upon have been seized by the enemy, perhaps are held, or the coal destroyed: so we must have colliers with us. In order to keep our ships free to work under steam they must have colliers with them. In calm weather coaling at sea is not attended with any very great difficulty; but then we cannot always wait for calm weather, and then it comes to the question of how we are to coal, and I must say Lieutenant Lowry has done very great service in moving this question. I do not quite like his plan. I do not think the coaling can be done with any great speed in closed carriers, but there might be times when you could not coal in any other way. Therefore I think that if a steamer is sent out with coal to attend on the squadron or vessel, whichever it is, it would be very well if she had a hundred or so of these carriers, or carriers of a similar nature. I should not trust entirely to them: they would only be requisite under very exceptional circumstances. In my opinion a steam collier should carry actual coaling barges, say of 50 tons: let every collier that goes out with the fleet carry four large iron barges properly fitted with fenders, then there would be no more difficulty in coaling at sea in moderate weather than there is in coaling in an open roadstead which we have all experienced, and, as far as passing through the water is concerned, in the Mersey it is seldom you have a tide of less than 5 knots, which is exactly the same thing as passing through the water at that speed when under weigh. I think it would be a good thing if the colliers which are sent out to the fleet were provided with various appliances—among them some means of carrying coal, such as that proposed by Lieutenant Lowry. Of course it is necessary to coal at great speed, where you can, and the system of coaling at speed, no doubt, rests in a great measure on having the coal in bags. There might be some question about the stowage of coal in bags on board ship, whether the material would be liable to cause spontaneous combustion or something of that sort; but if the tar in the present bags is a source of danger, we must find bags which are not so dangerous. Coal, I consider, should be carried in bags; the colliers should be supplied with coal-lighters and perhaps, in addition, some of these carriers. I think the Institution has every reason to thank Lieutenant Lowry for bringing this subject before them.

The CHAIRMAN: Failing anyone else making a few remarks, perhaps you will allow me to do so. I have been unexpectedly asked to take the chair here to-day, having intended to be present at an interesting lecture now going on at Woolwich on a question in which we all are interested—the bombardment of the forts of Alexandria—but there was a failure of a Chairman, and I am only too glad to supply his place. I am not prepared to enter into any particular remarks on the question beyond those which suggested themselves as the paper was being read. I think we cannot express ourselves too strongly upon the matter of an Officer like Lieutenant Lowry bringing such a paper to the notice of the Institution. It is extremely valuable that we should have the ideas of the younger Officers in the Service, because they are the people who have to encounter and overcome such practical difficulties as exist in coaling ships at all times, and especially at sea. Now the question of coaling ships at sea is no doubt an extremely important one, and yet one which I believe has hitherto received little or no attention. I regret that we have not some one from the Admiralty here to-day that we might hear what their opinions on the subject are. Lieutenant Lowry commences by expressing his idea of the great importance of the subject, that it should be fully considered before the outbreak of a naval war, and there is no doubt the only people who can really take that subject into satisfactory consideration are the Admiralty themselves. Probably

they may be induced by what passes here to-day to give at all events some passing consideration to it. The point which Lieutenant Lowry dwells on next, and which I think seems to be of the greatest importance, is that it is not the difficulty of filling the coals on board the collier or of hoisting them in on board a man-of-war, but the difficulty of how to get over the intervening water space between the collier and the ship. I am sorry to say that I cannot for one moment believe in the practicability of this plan which has been put before us to-day. Its great merit is, I think, in directing attention to the necessity for some means of getting over that intervening space between the collier and the ship wanting the coals. There is no doubt that there must be colliers accompanying our squadrons in the future, and the question is, how to get over the intervening space of water between them and the ships. Take the type of vessel which we all know now, the "Hecla" type, which has been so successfully fitted as a torpedo-ship, and imagine her used as a collier. I believe that will be something of the type of ship that will be employed as a collier in the future. We have now the means of hoisting up very heavy torpedo-boats. That is a necessity which was forced upon us, and as soon as it was forced upon us it was successfully overcome. There are some davits now made which, with perfect safety, will hoist up all but the first-class torpedo-boats. I think Captain Noel has hit exactly upon the right means of overcoming the difficulty of getting over the intervening space. Coaling must always be done, I believe, by bags, and not by vessels constructed of hard, rigid, uneven surfaces, and there would be no difficulty in making bags incombustible, not liable to spontaneous combustion, and with these davits I have mentioned, there would be no difficulty in hoisting up suitable boats (I will not call them barges) for conveying the coal from the collier to the man-of-war. Those boats I imagine would be devised to carry from 20 to 25 tons, and with a turtle-back deck over them, leaving only a space in the centre, also protected by a high combing, through which the coals would be hoisted out. Then you would be able to get your coals in or out equally as well when the ship was going 5, 6, or 7 knots as when she was at anchor, because it would be only a question of the seaworthiness of the boat. Admiral Selwyn has adverted to several points which certainly are extremely important, although perhaps not under discussion at the present moment. One was economy of fuel. I remember twelve or fourteen years ago, when some contracts passed through my hands, putting the point, which was very much criticized at the time, that no contract should be entered into by the Admiralty for engines until 1 h.-p. was obtained for every 1 lb. of coal consumed.

Admiral SELWYN: It has been done in my presence under the test of the dynamometer.

The CHAIRMAN: Captain Bedford Pim's ideas as to sailing ships must be looked upon as very retrograde. The "ironclads" he talks of did very good service at Alexandria, and had they been limited to their sails they would have made a very poor show indeed.

Captain BEDFORD PIM: They were but weak forts. I did not say confine the vessels to sail.

The CHAIRMAN: I have had the pleasure of commanding several of those ironclads, and I have not had more pleasure in a wooden ship than I have had in an ironclad. One of the great objections to this proposal, I think, is the vast space which would be wasted, I mean so far as stowage is concerned, by the air space required for each carrier. I have seen a good deal of hoisting things in tideways and so on, and I do not believe those carriers could be hooked on and hoisted in with a ship going 5 knots. Allowing for the ingenuity and thought which has been bestowed upon it, I can only say, as an old practical seaman, that it is not in my opinion practicable. As the greater part of this paper is devoted to the details of the construction and management of the carriers, I really do not know that I could occupy your time to any advantage by saying anything more about them, but what I do hope is that the discussion of this matter here, and possibly elsewhere, may lead to the appointment of one of those bodies of men which appear to be deprecated so much by Admiral Selwyn, namely, a Committee to consider the question. I believe myself in the usefulness of Committees. Probably I may be influenced in that opinion by having served on them myself;

but I do think that this is especially a subject upon which the appointment of a Committee to inquire into the whole matter, and to make suggestions and recommendations, would be extremely useful.

General LOWRY: You will not, I am sure, look for any comment at my hands upon the discussion which has taken place. I am glad to have had the privilege of reading my son's paper on this occasion, and I thank you for the great attention you gave it. I shall be yet more glad if—as Admiral Luard said—it tend in any way to call public attention to a matter of grave and pressing importance. Whatever may enable us more efficiently and promptly to coal our Navy will be a step in the right direction, and one on the accomplishment of which vast issues may hinge. It must needs not only affect the defence of that commerce of ours, which a nation that is not well prepared to defend will not long possess, but of those great Colonies of England which form her magnificent heritage in all parts of the world. I thank you much.

On the motion of the Chairman, seconded by Captain Pim, a vote of thanks for the paper was voted to Lieutenant Lowry, and to his father for reading it, and on the motion of Captain Jackson, R.N., a vote of thanks was passed to Admiral Luard for presiding.

The resolution was agreed to.

Friday, April 20, 1883.

LIEUTENANT-GENERAL SIR E. B. HAMLEY, K.C.B., R.A.,
in the Chair.

THE RUSSO-TURKISH FRONTIER IN ASIA MINOR.

By Major E. CLAYTON, R.A.

The CHAIRMAN: I have the pleasure to introduce to you Major Clayton, who is going to favour us with a lecture on the present Russo-Turkish Frontier in Asia Minor. He has had peculiar opportunities for studying his subject, for subsequently to the Treaty of Berlin, according to a compact between our Government and the Turkish Government, British Officers were sent to Asia Minor to exercise some species of control and supervision, and Major Clayton was one of them.

I HAVE felt much hesitation in acceding to the request of the Council of the United Service Institution that I should read a paper on the new Russo-Turkish Frontier in Asia, on account of the very slight personal acquaintance that I have with the actual line of the frontier; but I was very loth to decline the honour done me by the request, and I have therefore endeavoured to bring together the principal considerations that seem to me involved in the frontier, and I hope there may be some among the audience who will kindly correct me if I have fallen into any errors.

Before coming to the consideration of the new frontier it may be as well to look first at the frontier as it existed before the war of 1877, and at the influence of that line upon strategical conditions, and then we shall be in a better position to understand the changes which have been brought about in these conditions by the new line.

The old frontier, from the Black Sea to Little Ararat, where it joined the frontier of Persia, was about 250 miles in length. Starting from the Black Sea, north of Batoum, it followed a ridge of mountains varying from 7,000 to 10,000 feet in height. Crossing the valleys of the Poskoff Tchai and Kura it continued along the watershed until it reached a small tributary of the Arpa Tchai, which it followed to its junction with that river. It then followed the course of the Arpa Tchai nearly to its junction with the Aras, or Araxes, and then turned south-west till it reached the crest of the range of mountains forming the southern boundary of the system of the Araxes, and continued along this ridge over the summit of the Greater Ararat to the Lesser Ararat, where it joined the Persian frontier.

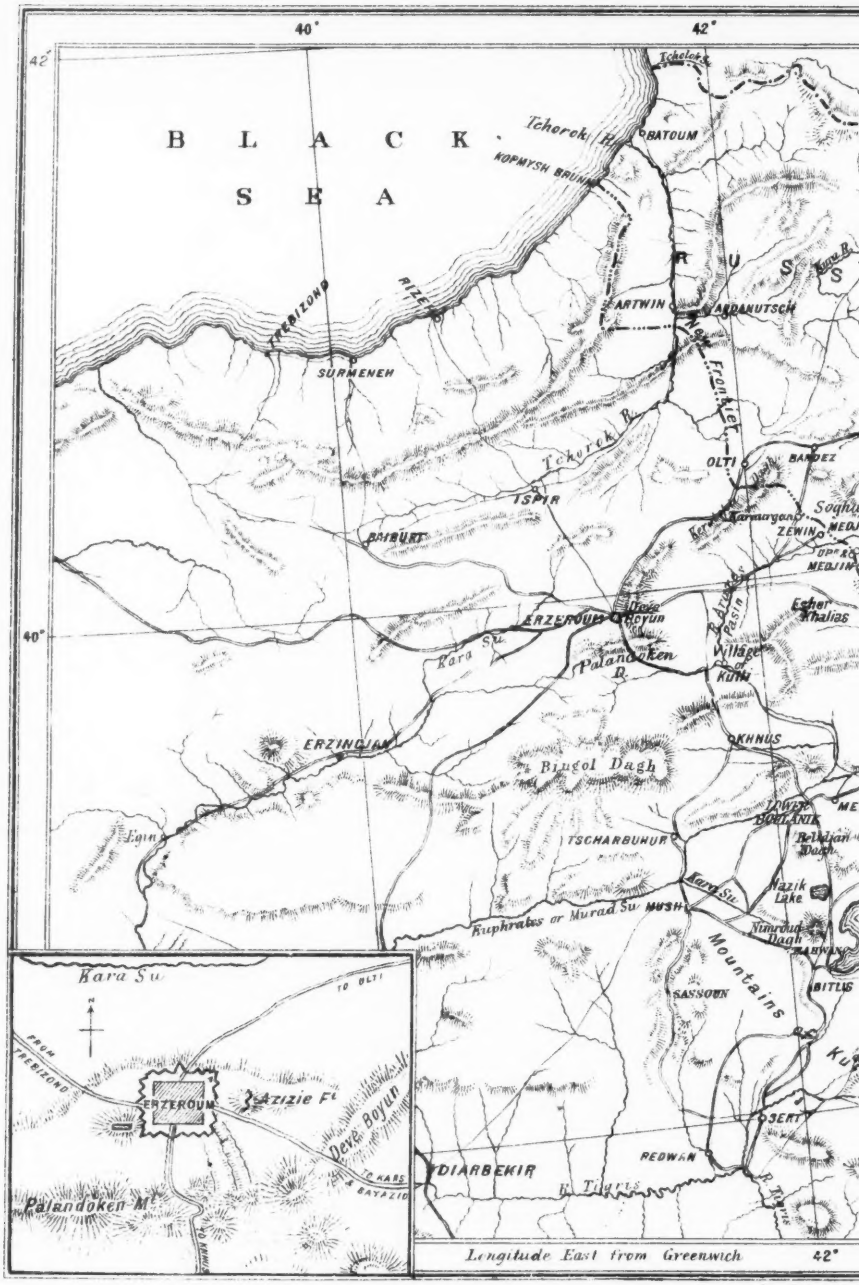
The number of routes leading across this frontier was not great. In the first place there was the coast road to Batoum. This was

easily defensible against an enemy coming from the north, and in fact Batoum successfully resisted all attacks made on it during the last Russo-Turkish War. Next come the routes leading from Akhaltzik and Akhalkalaki on Ardahan. These were both difficult roads for any but small columns, and were closed on the northern side of the frontier by the towns of Akhaltzik and Akhalkalaki, and on the Turkish side by Ardahan. From Akhaltzik to the interior of the Russian province the route is through the Borjom Pass, a very narrow defile which could be easily closed. There is also a road from Akhalzik *viâ* Akhalkalaki to Alexandropol. On the Turkish side of the frontier difficult routes led from Ardahan to Erzeroum, *viâ* Olti, and to Kars.

Next came the most important road of all, namely, that from Alexandropol, by Kars and the Soghanli Dagh, to Erzeroum. This is by far the easiest road across the frontier, and in fact it has always been used as the main line of advance in all Russian invasions. On the Russian side it was closed by the fortress of Alexandropol, while on the Turkish side stood the famous fortress of Kars, which has always been considered of great importance, although experience has usually shown that it could be easily masked, and the real resistance to Russian invasion has been made at the Soghanli Dagh. This range of mountains can be crossed by wheeled vehicles at several points, but nevertheless offers favourable positions for defence against an enemy coming from the north.

Farther east, again, there is more than one difficult pass across the range bounding the basin of the Araxes on the south, leading into the valley of the Murad Su, and a fairly easy pass leading from Igdyr to Bayazid, close to the western foot of Ararat. These routes are not favourable, however, to the operations of a force intended to act in the direction of Erzeroum and the Anatolian peninsula, on account of the exposure of the communications to a hostile force based upon the Lake of Van. During the recent campaign the Russian General, Tergukasoff, after his indecisive action against Mukhtar Pacha, at Eshek Khalias, was obliged to retreat on account of the advance of a Turkish and Kurdish force from Van on Bayazid.

On the whole, then, the old frontier may be considered to have been very favourable for defence against Russian invasion. Batoum secured the coast road and the difficult route up the valley of the Tchorok. Ardahan, if properly fortified and garrisoned, would have closed the roads by Akhalzik and Akhalkalaki, and even when it fell it was difficult to move any large force by the route through Olti to Erzeroum. On the right flank, again, of the Turkish line the danger was not very great. A Turkish force at the Soghanli Dagh would be on interior lines with regard to Russian forces advancing simultaneously from Alexandropol and Bayazid, and might defeat them separately, as happened in 1877; or a small force based on Lake Van might compel the retreat of the Bayazid force by acting on its communications. Therefore the main line of Russian advance must almost necessarily be from Alexandropol on the Soghanli Dagh. Here the actual line of the frontier was not favourable for the defence, as was shown by the defeat of Mukhtar Pacha at the Aladja Dagh. Any



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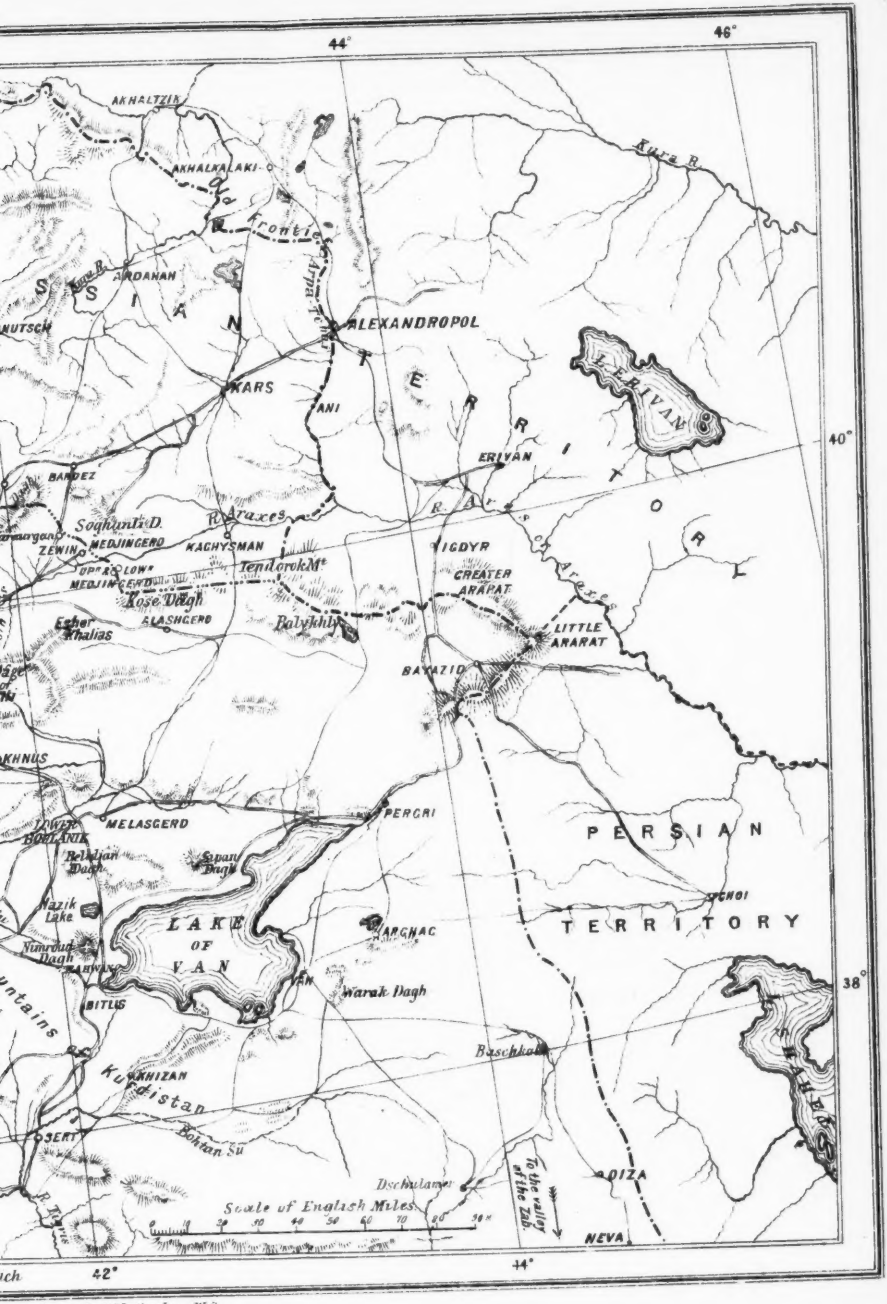

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position could be much too easily turned to be desirable as a field for obstinate resistance, but nevertheless an army assisted by the fortress of Kars would have favourable opportunities for delaying an enemy's advance until measures were taken for the defence of the Soghanli Dagh, and for the security of Erzeroum; and then a probability would remain of successful resistance at the Soghanli.

The events of the last war were an illustration of this. The Russians failed to advance very far on either flank, though Ardahan was not properly held and fell at once, and Mukhtar Pacha was able to repulse the first attack on the Soghanli. But afterwards the error was made of attempting to hold the line of the frontier; Mukhtar was outnumbered, outflanked, and heavily defeated. After this he was no longer able to hold the Soghanli, but was obliged to fall back on Erzeroum. Before this city he tried to hold the position of Deve Boyun, but it was too extended for his force, and his army was driven into Erzeroum. This fortress held out till the close of the war, It was, however, winter, and the Russians were unable to bring up siege guns.

To turn now to the new frontier. It leaves the Black Sea at the promontory of Kopmysh, south of the mouth of the Tchorok River, and runs up to the crest of the range of mountains dividing the upper course of the Tchorok from the Black Sea. It then runs along this crest as far as a point a little to the south of Artwin, and then turns in an easterly direction and passes a little south of Olti to Karaurgan. From Karaurgan it passes between the villages of Upper and Lower Medjingerd, across the Araxes, to the crest of the ridge dividing the basins of the Araxes and Murad Su, just north of the Köse Dagh, and from this point it follows the watershed until it reaches the old frontier at Mount Tendorak. The portion of territory thus added to the Russian dominions includes the port of Batoum, the lower part of the valley of the Tchorok, which is navigable as far as Artwin, the head-waters of the Kura, the basin of Kars, and the Soghanli Dagh.

We will now consider what effect on the strategic conditions this new frontier will produce. We have seen that under former conditions the only favourable line of Russian advance was that from Alexandropol *viâ* Kars and the Soghanli Dagh upon Erzeroum. The actual frontier was hardly defensible, but facilities existed for delaying a hostile advance from the north until the Soghanli Dagh could be strengthened so as to make a formidable position for defence. The forcing of this position should at all events have required a considerable time, and have delayed the enemy long enough to prevent him from appearing before Erzeroum before the short season suitable for active operations had come to a close. For it must be remembered that in these highlands, not less than 6,000 feet above the sea, the snow is not off the mountains till May at the earliest, and falls again in the latter part of November or beginning of December, and for six months at least of the year all transport of heavy guns would be impossible.

But what is the case now? Batoum is in the hands of the Russians, though it would probably not be used as a base for a serious advance into the interior, as the road up the Tchorok Su by Artwin and Ispir

is extremely difficult, and not at all fitted for the movement of any considerable body of troops.

But it is different with the next route across the frontier. Ardahan and Olti are both now Russian, and the most difficult part of the road is within the Russian frontier, between Ardahan and Olti. From Tiflis to Ardahan the road is certainly carriageable, though probably difficult in parts in bad weather. From Ardahan to Olti the road is probably only passable for wheeled traffic in fine weather, but there is little doubt that the Russians are at work upon it and intend to make it a good road all the way. From Olti to Erzeroum is only a little over 70 miles, and although there is a bad pass over the Keretchli Dagh it would probably be possible to get guns over it.

Then as regards the main road from Alexandropol by Kars, the Soghanli Dagh is now in the hands of the Russians, and although the position at Zewin, where they were defeated in 1877, still remains to Turkey, yet it is within a stone's throw almost of the frontier. And as in any future hostilities it can hardly be doubted that the Russians will be most quickly prepared, they might advance across the frontier instantly war was declared, and seize this position. Then there would be nothing between them and Erzeroum except the position of Deve Boyun, which requires a large force to hold it, certainly not less than 25,000 men, and it would be very problematical if the Turks could collect that number, or anything like it, before the Russians could be upon them.

Therefore the Russians could now have two practicable lines of advance upon Erzeroum instead of one, and could collect their forces at their leisure at Olti, only 70 miles from Erzeroum, and behind the Soghanli Dagh, with a communication between the two parts of the force *viâ* Bardez. And there would hardly be a possibility of the Turks being able to offer any effective resistance before the Russians could arrive in front of Erzeroum.

At the eastern extremity of the frontier the conditions remain much as before, except in the respects that will be alluded to later.

We have seen that no serious obstacle now intervenes between the Russians and Erzeroum. The question suggests itself, What powers of defence does Erzeroum possess? The city is situated at the northern foot of the Palandoken range of mountains, just where the ground begins to rise from the plain that stretches northward to the Kara Su or Western Euphrates. The town stands on the slope, so that its northern extremity is perhaps 200 to 300 feet above the plain, while its southern limit is 200 to 300 feet higher again. South of the town the ground continues to rise gently for about 2 miles to the actual foot of the mountains, which then rise very steeply. This ground is cut by the ravines of several torrents descending from the mountains, especially towards its eastern portion. Eastward of Erzeroum the mountains sweep round to the northward, and fall to the low ridge of Deve Boyun, or Camel's Neck, over which leads the main road from Erzeroum to Kars, and also to Persia *viâ* Bayazid. The city is surrounded by a rampart in the general shape of a square, and irregular in trace. The principal entrances are defended by small ravelins, but

there are no other outworks. There are two principal detached forts, one on a hill to the east of the town commanding the road over the Deve Boyun, and the other smaller one on a hill to the south-west of the town. There are no masonry revetments to any of the ditches, nor is there any bomb-proof accommodation. Moreover, large breaks exist in the *enceinte* in several places, so that in its present condition the place is not even secure from assault. I am not aware of the number of guns that are mounted. Independently of the weakness and insufficiency of the works now existing, the place is fully commanded by the ground south of the town between it and the Palandoken, and as far as I am able to see must fall within a very short time of a declaration of war by Russia. It may be said that in the late war Erzeroum held out for four months, and still remained in the hands of the Turks when peace was made. That is certainly true; but then it must be borne in mind that in that campaign it was not till the 4th of November that the battle of Deve Boyun was fought, and the Russians were able to appear before Erzeroum, and that then the weather would not allow of heavy guns being brought up. And again, Mukhtar Pacha's army, which took refuge in the fortress, though beaten was yet considerable in numbers, and composed of seasoned troops trained in many a previous fight, whereas in a new war the probabilities are that a very small force could be collected in time to meet the Russians. There is one *Corps d'Armée*, the 4th, stationed in the whole of Armenia and Kurdistan, about twenty-five battalions; but I know that many of these battalions, when I was in that part of the country, were not more than 300 to 400 strong, so that the *Corps d'Armée* could not consist of more than 10,000 infantry at the outside, scattered over a large space of country. No doubt a certain amount of time for preparation might be allowed, yet the Russian concentrations might be made easily and quietly along their good roads within a short distance of Erzeroum, while the augmentation and concentration of the Turkish troops would be much more difficult. Reinforcements of regular troops must come either from Anatolia by long marches over very indifferent roads, or by sea to Trebizond, and thence to Erzeroum, over a road which when first made was no doubt good but which has deteriorated to such an extent that in parts it is now scarcely passable by wheeled vehicles. I have myself seen wagons stuck axle-deep in the mire, so that the horses of several had to be harnessed to them one at a time to extricate them. And the Redif, or reserve, would take a considerable time to call out and organize. I believe, therefore, that the Russians would appear in front of Erzeroum within a very short time of the declaration of war, and while the Turkish army was still weak and disorganized. And it could be early in the season, so that plenty of time would remain for bringing up heavy guns. If the fortifications of Erzeroum had been sufficiently strengthened to be secure against assault it is possible that the Azizie fort might prevent heavy guns being brought over the Deve Boyun to the commanding ground south of the place, especially as it is so much cut up by ravines; but there is a road over the Palandoken mountains by which they might be brought. A long détour would certainly be necessary, and

the pass is difficult, but decidedly not impracticable, especially as the ascent on the south side is comparatively gentle and easy, and it is the north or descending side which is steep and where the principal difficulties exist.

I am therefore driven to the conclusion that Erzeroum must fall at an early period in any future campaign between Russia and Turkey, leaving plenty of time for further operations before the season became too far advanced, unless opportunity had been given and taken advantage of to make considerable additions to the defences of the place.

To give any reasonable prospect of Erzeroum offering a prolonged resistance it would be necessary to deny the enemy access to the commanding ground south of the place. For this purpose it would probably be necessary to construct supplementary works between the Azizie fort and the Palandoken, to secure the pass across this range and also to strengthen the south-western detached fort, and construct other works between it and the mountains in order to prevent an enemy reaching the commanding ground from the west. This he might otherwise do, either after having passed round the north side of the town from the Deve Boyun or after having debouched on to the plain by the road from Olti. It would also of course be necessary to repair the present *enceinte*.

A general view, then, of the probable course of events on a declaration of war between Russia and Turkey would, I think, present the following features: Firstly and principally, an advance by the Soghanli Dagh, and probably also by Olti, on Erzeroum, followed by an early fall of that fortress. The Turkish efforts would, in all probability, have been centred in an attempt to save Erzeroum, and the way would have been left open for an advance also from Erivan on Bayazid, should the Russians so desire.

It may be well here to cast a passing glance at the nature of the country bordering on the frontier on the Turkish side. The principal features of the Armenian highlands may be thus described. The surface of the country is generally hilly, in many parts mountainous; but scattered about among the hills are a number of plains of greater or less extent. The hills and mountains are, as a rule, rugged and stony, and are uncultivated, being used only for pasturage. In the spring a greenish tinge creeps over them from the growth of grass and numerous flowering herbs; but as the summer, which is almost entirely rainless, goes on, the vegetation becomes dried up, and the whole landscape presents only various tints of brown and red. The plains are, as a rule, very fertile, and in those cases in which the streams that flow through them can be diverted for irrigation purposes, plentiful crops of cereals are grown. But in some parts the streams have worn for themselves such deep ravines in the soft strata, that their waters cannot be used for irrigation, and in these cases the crops depend, to a great extent, on the amount of snow which falls in the winter and soaks into the soil when melting, and upon late rains in the spring; and when these fail, as was the case in 1879, the year I went out, deficient harvests and famine are the result. The geolo-

gical formation of many of the plains consists of a great series of thin-bedded, marly clay-stones, the degradation of which forms a fertile soil, but one which bakes very hard in the sun, and which apparently does not retain moisture very long, and therefore requires irrigation or late rains. Such are the plains of Erzeroum, Pasin, and Khnus, and others of less importance. But some other plains, such as that of Boulanyk and others of less extent on the western shore of Lake Van, have been formed by the degradation of soft lavas which have been poured forth from the great volcanoes of Sipan, Nimroud, and others. The soil so formed, though very light and powdery in appearance, seems to retain moisture better, and these plains are therefore less dependent upon the seasons, and their crops seldom if ever fail altogether. There is yet another type of plain, of which a considerable part of the great plain of Mush is an example, where the soil is a deep alluvium, and this also retains moisture well, so that the crops on it are less precarious. The mountains are also of different types. Some of the great ranges, such as the central Kurdistan mountains, are principally formed of mica-schist and other metamorphic rocks, the strata being tilted up at a very high angle, with occasional outbursts of basalt, porphyry, and other igneous rocks. Other masses, usually of minor extent, are formed altogether of outbursts of igneous rock, and others again are formed of sub-crystalline limestone, while others are extinct volcanoes pure and simple, of which there are several near the Lake of Van, and others between Van and Bayazid. The country as a whole may thus be divided into the hilly regions of pasturage and the agricultural plains. The population may also be broadly divided into corresponding classes. The hills are usually occupied by the Kurds, who are predominatingly pastoral, while the agricultural Armenians occupy the plains. But this can only be considered as a broad generalization. There are many Kurdish villages in the plains, and in the central Kurdistan mountains the Kurds and Armenians are intricately intermixed, while in the very highest mountains south-east of Van are found the Nestorian Christians, certain tribes of which enjoy something approaching to independence through the extreme difficulty of communication with their narrow valleys hemmed in by very lofty and steep mountain-ridges.

Of wood there is a great lack throughout a large part of this tract of country. The ranges bordering on the Black Sea bear luxuriant forests, but when once these ranges are crossed the eye may travel over the country for scores of miles in every direction without resting on a single tree. The Soghanli Dagh has forests, but these have now passed into Russian hands, and not a stick is found growing in all Turkish Armenia, except in the enclosures in the immediate neighbourhood of a few towns and villages, until the central range is reached. On the northern slopes of this range considerable quantities of a scrub-oak, interspersed with dwarf cedars, are found, and, as one penetrates into the interior of the mountains, the forests become more extensive, and the trees of larger growth.

Such being the general aspect of the country, the opening of the events of a new Russo-Turkish campaign, as I have sketched them

out, would place Russia in possession at once of the plains of Erzeroum and Pasin, and in great probability also of Alashgerd, the basin of the head-waters of the Murad Su or Eastern Euphrates. In each of these a fair amount of supplies would probably be forthcoming; but it must be remembered that from the effects of war, famine, Kurdish depredations, and the exactions of the Turkish officials, the population has been diminishing and getting poorer, and the extent of land under cultivation has been getting less, so that these plains, fertile as they are, can now not supply anything like the amount of food-stuffs that their natural capabilities would promise. The country round Bayazid would not be able to supply much, but it would be easy there to procure supplies from the rich plain of Erivan, or even from Persia.

If these would be the probable results of the first events of a campaign, the next point is the course likely to be subsequently pursued.

Let us first note the principal routes leading from the country supposed to have come into the possession of the Russians, into the interior of the Turkish dominions, or which might be used by the Turks for bringing up reinforcements.

In the first place there is the road from Trebizond to Erzeroum. This would be the quickest way the Turks could bring up troops, supposing they retained the command of the sea. The character of the road has already been mentioned.

Next comes the post-road from Constantinople through Amasia and Kara-Hissar. This is joined by a road from Kaisariyeh, thus communicating with the southern portion of the Anatolian peninsula.

Next comes the road to Erzinjan, and thence by Egin to Diarbekir, or by Sivas to Kaisariyeh.

Of these the post-road to Constantinople is certainly practicable for wheeled vehicles, but I have not enough information to be able to speak with certainty about the other routes.

Then comes a route from Erzeroum to Diarbekir by Tchabakchur. This passes through a very wild country and is difficult, and utterly impassable for six months in the year.

Next there is a road from Erzeroum to Mush by Khnus. The wagon-road makes a circuit through the Pasin plain, but there is a shorter route over the Palandoken mountain. This would not generally be used for wheeled traffic, but it would not be impossible to get guns over it. The ordinary road is easy, and continually traversed by bullock-carts. It passes first the Pasin plain already spoken of, and then that of Khnus, where supplies should also be plentiful. Mush is situated at the northern foot of the central Kurdistan range, and looks over the splendid plain of Mush, watered by the Murad Su and its tributaries. From this route another good road branches to Bitlis, passing through the very rich plain of Boulanyk, and then along the strip of ground between the great volcano of Nimroud and the beautiful Lake of Van. Bitlis is a large town of some 40,000 inhabitants, situated in the narrow valley of one of the tributaries of the Tigris, and is a place of considerable business, being on the high road between Mesopotamia and the Armenian highlands.

Next comes the post-road from Erzeroum to Van, which passes by Melasgerd and the north of the lake. This is also a road practicable for wagons, though difficult in places.

All the above routes diverge from Erzeroum, or its immediate vicinity. Going further east the next route is from Alashgerd down the valley of the Murad Su to Melasgerd, and thence through Boulanyk to Mush and Bitlis, or to Van. I have no certain information about the road from Alashgerd to Melasgerd, but when I was once at Melasgerd I was told it was a fair road. The roads through Boulanyk and to Van are good.

Lastly there is the route from Bayazid to Van. This route passes over very high ground, is impracticable for wheeled traffic, and dangerous in summer to the traveller on account of the frequent raids over the Persian frontier. When I passed it eighteen months ago, on my return to England, I was obliged to have an escort of some twenty Kurds, in addition to the Turkish zaptiehs. In winter it is entirely closed by the snow.

Let us now examine what would probably be the further operations of the Russians. They might apparently have either of two main objects. Firstly, an advance on the Anatolian peninsula, and finally on Constantinople; or, secondly, the entire subjection of Armenia and Kurdistan, and the acquisition of the outlets into Mesopotamia and Syria.

Suppose the first of these were their object. Before advancing much further it would be necessary to secure their communications, which, if they advanced from Erzeroum, would obviously be exposed to an enemy posted anywhere in the direction of Mush, Bitlis, or the Lake of Van. It is only five or at most six days' march from Mush to Erzeroum, so that a force might be collected in the rich plain of Mush, which could place itself in a very short time on the Russian communications. If the Turks retained command of the Black Sea it would be especially necessary for the Russians to protect their communications well, because the whole reinforcements and supply of their army would have to be carried out along this single line. If the Russians should get command of the sea this would be of somewhat less importance, as they might form subsidiary bases at the various ports along the northern coast of Anatolia as the army advanced. In view of this sensitiveness of the Russian line of communications it would probably be sound policy for the Turks, at the opening of the campaign, if not in a position to meet the Russians with a fair promise of success in front of Erzeroum, to retire towards Khnus and Mush, after throwing a sufficient garrison into Erzeroum, rather than to retreat towards Constantinople. They would thus hinder the Russians from advancing perhaps more effectively than by frontal resistance, and oblige them to employ so large a force in operations to secure their communications as to seriously diminish the numbers available for the main operation.

Therefore it would appear that the Russians, after the capture or the masking of Erzeroum, must operate towards Mush and the Lake of Van before they would be able to advance with safety towards

Constantinople. If their main object were the second alternative mentioned, namely, the subjection of Armenia and Kurdistan and the gaining possession of the outlets into Mesopotamia and Syria, they would have to operate in the same direction. It would therefore, perhaps, not be uninteresting to consider the general features of the country south of Erzeroum and between Lake Van and Mesopotamia.

Let us then suppose we are going from Erzeroum to Mush. The most direct way, and that usually taken in summer by travellers on horseback, leaves Erzeroum by its southern side and crosses gently rising ground to a gorge in the Palandoken mountains. It proceeds up this for a mile or mile and a half, and then turning to the left rises steeply up a spur, and winding round the head of the gorge reaches the crest of the mountain. From this crest a wide view is obtained of rolling hills, covered more or less with herbage, stretching away to the south till the prospect is bounded by the Bingöl Dagh, a long, smooth ridge rising to some 10,000 feet above the sea, on the upper slopes of which patches of snow remain all the summer. No sign of habitation or cultivation is perceived. Over and among these hills the road takes its way, here and there passing a poor village in a valley with scanty patches of cultivation round it. Several streams are crossed, and then the Araxes is reached in the neighbourhood of Külli. At this point the route under consideration is joined by the wagon-road which leaves Erzeroum on the east, and crosses the ridge of Deve Boyun, rising some 800 to 1,000 feet above the plain of Erzeroum. On the east side of this ridge the road descends into the Pasin plain. From this plain diverge the roads to Kars by the Soghanli Dagh, to Bayazid *viâ* Alashgerd, and by Külli to the regions bordering Lake Van. The Araxes, which is here a considerable stream, is crossed by a ford at Külli. A bridge also exists 2 or 3 miles lower down. From Külli the road to Van *viâ* Melasgerd branches off. Shortly after passing the the Araxes the road crosses a ridge connected with the Bingöl Dagh, on which a defensive position might be found, but it could be turned by a circuit to the east. From this ridge the road descends to the wide plain of Khnus, which takes its name from a village and castle situated on one of the numerous streams which flow from the Bingöl Dagh, and have cut deep ravines with perpendicular walls in the plateau. Most of the houses are built at the bottom of the ravine, which may be 200 to 300 yards across; but the old Genoese castle stands on the upper edge of the cliff overlooking the plain. This was the furthest point reached in this direction by the Russians in 1877. The plain of Khnus is cultivated and rich, but liable to suffer from drought. The road to Mush crosses this plain, having on the right hand the Bingöl Dagh and on the left a range of hills separating the plain from the valley of the Murad Su. After crossing the Kizil Tchai by a ford the road ascends these hills, which are of a rolling character, and give pasturage in summer to the Kurds, and descends to the Murad Su near the neat Circassian village of Tcharbuhur. Then the course of the Murad Su is followed on its right bank passing through a range of hills by a gap which might be defended. A castle stands on an isolated hill at its further end, where

it debouches into the great plain of Mush, thickly dotted with villages and bearing good crops, though much of the land is not under cultivation. Beyond the plain are seen rising, steep and rugged, the main range of the Kurdistan mountains. The Murad Su is crossed by a bridge which was once a fine structure of twelve arches, but now all the arches except three have been destroyed, though the piers remain, and very bad wooden spans have been substituted. In their present condition they would not bear guns, but could be repaired by engineers possessing timber, but none could be obtained in the immediate neighbourhood. In the height of summer the river is fordable, though even then rather deep. Mush stands on the steep slopes at the mouth of a gorge in the mountains, and is very picturesque, but dirty and unhealthy, and the Moslem inhabitants are very fanatical. It is the seat of a Mutessarif; population about 15,000. The great plain of Mush contains a population of about 50,000, of which about 36,000 are Armenians, and the bulk of the remainder Kurds, with a few Turks, Circassians, and Yezidis. Below the plain of Mush the Murad Su passes through gorges along which runs a very bad road to Kharput.

The road from Khnus to Bitlis passes across the very fertile plain of Boulanyk, through which also the Murad Su flows, but which is divided from the Mush plain by a range of hills of moderate elevation, rising about 1,000 feet above Boulanyk, and 1,500 to 2,000 above the Mush plain. The road then crosses a ridge connected with the extinct volcano of Belidshan, and passes the Nazik fresh-water lake, and then descends to the shores of the great Salt Lake of Van, along which it proceeds to the south-western extremity of the lake. In the right of the road rises the great crater of the Nimroud Dagh. It is possible to ride up the mountain on the side facing the lake, and on reaching the lowest point of the summit ridge, some 2,000 feet above the level of the lake, one finds one's-self on the edge of a vast circular crater, between 4 and 5 miles across from lip to lip. The sides descend very steeply for 700 or 800 feet below the lowest point, and the bottom of the crater is occupied by a flat broken dome, among the hollows of which, and in the ring between it and the sides of the crater, are a number of tarns, one at least of which has several hot springs rising in it. Part of the floor of the crater is covered with birch scrub and creeping yew, which are valuable in this treeless region, and it is for the bringing of the wood to the villages that the road has been made into the crater.

From the south-west angle of the Lake of Van the road mounts on to a plateau called the Rahwan, lying between the Nimroud Dagh and the Kurdistan mountains. This plateau lies only between 400 and 500 feet above the level of the lake, but in the winter it seems to be the meeting-place of storms, and is very dangerous to cross in unsettled weather. I have myself seen from 6 to 8 feet of snow lying on it in the last week of March. It is apparently formed of lava which has flowed from the Nimroud Dagh, and it seems to me to be possible that this lava-flow has been the origin of the Lake of Van. Beyond the plateau to the west lies the flat alluvial plain of Mush, about 1,000 feet lower than the present level of the lake, and it would seem at all

events not impossible that the basin where the lake now is was once drained through this plain into the Euphrates until the outlet was blocked by the lava. Vast sheets of lava have been poured out from the Nimroud and Belidshan Daghs, which by their degradation have formed fertile soils. A great sheet of black lava has also been poured out on its north side by the Sipan Dagh, the highest mountain in these parts, which rises in a superb isolated cone on the north of the lake for some 7,000 feet above its level, and whose summit is covered with perpetual snow. From the Rahwan the road descends a narrow valley for a few miles to Bitlis.

The Lake of Van is a most picturesque sheet of clear blue water, about 80 miles in its greatest length and 40 in its greatest breadth. Its surface is nearly 5,500 feet above the level of the Black Sea. On its southern shore it is hemmed in closely by the mountains, which rise in many places very steeply from its very edge, so that the road from Van to Bitlis is forced inland in some parts, and in others is a mere ledge on the steep hillside, quite impracticable for wheeled vehicles. On the west of the lake lies the Nimroud Dagh, and on the east is the not very extensive plain of Van, backed by a fine rugged mountain called the Warak Dagh. North of the lake the hills recede from its borders and are lower, so that the Sipan Dagh may rise in its solitary grandeur; several rivers run into the lake, but it has no outlet.

After this glance at the nature of the country let us turn again to the problems of a campaign. After the fall or masking of Erzeroum, I can see nothing to prevent the Russians from overrunning the whole of the country between Erzeroum and the Lake of Van. Defensible positions may no doubt be found on any of the roads, but the whole country is easily traversed by cavalry and infantry, and routes may certainly be found practicable for guns by which any position might be turned; so that it does not seem probable that if the Turks were not able successfully to meet the Russians before Erzeroum, they would be able to do so before the latter reached the northern base of the central Kurdistan range. But when this limit is reached very different conditions are met with. This range is a very formidable obstacle to the passage of troops. None of the roads across it are good, and most of them are extremely bad. The route from Erzeroum to Diarbekir, by Tchabakchur, has already been mentioned as very bad. Next come two routes from Mush through the Sassoon mountains. I have crossed the easternmost of these. It is excessively difficult. There are ascents and descents of 3,000 to 4,000 feet, the sides of the valleys are extremely steep, and it was with the greatest difficulty that I could get my baggage animals along in some places. The interior of these mountains is so difficult of access that the Turkish authority is not much more than nominal. When I passed, the Pacha of Sert was encamped in one of the valleys near the southern limit of the range with a small force of infantry and cavalry and two mountain guns, endeavouring to collect taxes from the Kurds, who had paid none for ten years; but I was told that he had been threatened with armed resistance if he attempted to compel payment. The Kurds in these parts are very wild and uncivilized. Each valley is at feud with all

its neighbours, and no one dare go out of his own valley. The Pacha, in addition to two troopers, caused a chief to provide me with an escort of his men, to my first halting-place, there to be replaced by others. On arriving at the village where I was to spend the night, the old chief received me with cordiality, and showed me a place to pitch my tents, and invited the Kurdish escort to sleep in his house. But they came to me and begged that they might be allowed to sleep outside my tent, as they were afraid of being murdered if they went into the village. There are a number of Armenians scattered about among these Kurds who are in a state of complete serfdom. They are considered to be under the protection each of a certain chief, who is supposed to prevent any one from injuring them. In return for this they must give him anything he wants, and ask his permission to marry, or even to buy new clothes, and have to make presents on the occasion. If a chief wants money he sells some of his Christians to another chief, who probably squeezes the purchase-money out of the victims themselves who are sold. But the villages are a pleasant contrast to the heaps of squalid hovels that one sees in the plains. The houses are generally substantially built of stone, and surrounded with the greenest fields and orchards, wherever a patch of level ground can be found, this vegetation forming a most striking contrast with the deep red and brown tints of the mountains. Some of the southern valleys are well wooded also, and very picturesque. The other route from Mush I am not personally acquainted with, but it is probably not much better, though I believe that during the Circassian immigration from Russia it was passed by families with their furniture and bullock-carts.

Next comes the route from Bitlis to Mesopotamia. The main caravan road passes through Sert, but though so constantly traversed is very hilly, rough, and bad—quite impassable by wheeled traffic in its present condition. There is another route which descends the whole way by the Bitlis river, which is said to be better, and which was used in the Circassian immigration. But even that is bad, and guns could not be taken by it without work being done on it.

If then the Russians wished to secure their communications previous to an advance through Anatolia they would probably occupy the country between Erzeroum and the Lake of Van as far as this range, driving any force the Turks might have there into the mountains, where they would hardly be able to follow them. The Russians would by this means also obtain the supplies of the rich plains which form the granary of the Armenian highlands. But if the Turks were enabled to deny the entrance into the mountains to the Russians the latter would have to leave a considerable force at the foot of the range to watch the passes, especially if the Turks were able, as they ought to strain every nerve to do, to retain possession of the plateau of the Rahwan at the head of the Bitlis valley. This would act as a *tête-du-pont* at the debouchure of the caravan route from Mesopotamia, under cover of which reinforcements might be pushed up from the south. To guard against danger to their communications from this point, the Russians would probably have to leave so considerable a force as to

seriously cripple any army that they would be likely to dispose of from Transcaucasia. And for the Turks to push up troops this way, landing them in the Gulf of Iskenderun, or at Antioch, and marching them *viâ* Aleppo, Diarbekir, and Bitlis, would be a very good scheme of operations in view of a Russian invasion, giving the means as it would both of arresting indirectly the enemy's march westward and meeting directly operations for the subjugation of Kurdistan and the acquisition of the entrances into Syria and Mesopotamia.

For now the second main object the Russians might have in view remains to be considered. The country and routes west of the Lake of Van have already been touched upon. There remains to be noticed the country east of that lake. And here a good deal would depend upon the attitude of Persia. If the Russians were debarred from Persian territory they would have great difficulty in penetrating south in that direction. Bayazid can be reached by an easy pass practicable for heavy guns, but south of that the difficulties begin. Immediately south of Bayazid rises a steep range nearly 3,000 feet higher than the ground below, over which the road passes, and on which the Turks held a position in 1877. This would be a formidable position to attack, and if possession of it were obtained it would require very great labour to get guns up to it; but after that was done there would be no very serious obstacle to be surmounted before reaching Pergri, at the head of the north-eastern arm of the Lake of Van. Of course if the Russian main object were to annex this district a force which has crossed the Soghanli Dagh, and thence marched by Melasgerd to Pergri, would soon render the position south of Bayazid untenable by threatening the communications of the force holding it. From Pergri there is a choice of routes to Van. The principal of these, which can be passed by wagons, follows the shore of the lake. There is also a frequented track that passes by Ertchek, but this is not practicable for wheels, a steep ascent having to be surmounted from Pergri. A favourable position for defence would be found on the heights south of the basin of Pergri, blocking the roads to Van. If this were forced many bye-paths are found besides the main tracks, so that any position could be turned, and further prolonged resistance would be difficult north of Van. Van is a city of some 30,000 inhabitants, of whom 20,000 are Armenians and 10,000 Moslems. The city proper lies in a plain about a mile from the lake, at the southern foot of a curious isolated rock of limestone, about three-quarters of a mile long, highest in the middle of its length and gradually declining to each extremity. This rock slopes steeply to the north, but its southern face is perpendicular. In this face are a number of rock-hewn chambers, associated in some instances with cuneiform inscriptions. An old castle stands on the rock with several tiers of walls on the north side, but it would offer but little resistance to a modern army accompanied by artillery. A double wall and ditch surrounds the town, but is utterly useless for defence. The main bulk of the population, however, do not live in the town, but in suburbs called the Gardens, which stretch for a considerable distance south and east of the town, and consist of orchards and

vineyards surrounded by mud walls. Among these orchards and vineyards the houses are scattered. The Gardens are commanded, to a very great extent, by a detached chain of rocky hills to the north, and altogether the place is incapable of defence. But south of Van the country becomes extremely difficult. The chief route to Mosul passes by Bashkala, the plain of Gevver and Shemdina, the country of Sheikh Obeydullah, about whom so much has been heard. A pass nearly 10,000 feet high has to be passed between Van and Bashkala, where a very strong position might be found, but the remainder of the route as far as Bashkala is fairly easy. Between Bashkala and Gevver, however, the road passes through gorges where the path is a mere track at the very edge of a torrent, and beyond Gevver is a very labyrinth of high and steep mountains and narrow ravines.

There are several other tracks across the mountains leading from Van to the valley of the Zab, or to that of the Bohtan Su, but they are most of them of extreme difficulty. One route that I took from Van to Sert by Khizan is fairly good for pack animals, passing through a magnificent country, abounding in game. There are rugged peaks, sweeps of forest and sparkling streams, and the basin of Khizan, to outward appearance, might almost pass for the happy valley of Rasselas. Coming to it from the north over a sandy ridge it lies at your feet like a park backed by a lofty range of snow-flecked peaks. Corn and rice-fields are diversified by clumps of trees and grassy knolls; there are hedges like those of an English lane, bright with wild roses and other flowers, while the clearest streams dash foaming over their rocky beds. But the road passes for miles along ravines and gorges, through which it would be almost impossible to force a way against armed resistance, and camping-places are few and far between.

The difficulties of penetrating south by the east of the Lake of Van are therefore very great, unless Persia allowed a passage through her territory, in which case the difficulties of passing the Kurdistan mountains might probably be circumvented. But this opens up a question beyond the scope of the present paper.

The general conclusions, then, to which the considerations I have been permitted to submit to you seem to point I think are these:—

1st. In the event of war breaking out again between Russia and Turkey the Russians would have no great difficulty in obtaining possession of Erzeroum and overrunning the country to the south-east of that place as far as the central Kurdistan range.

2ndly. Before an advance could be made by the Russians westward from Erzeroum, it would be necessary for them to secure their communications from danger threatened by any force that might be in the neighbourhood of the Lake of Van, or that could be pushed up from the south by Bitlis.

3rdly. If the Russians wished to get possession of Armenia and Kurdistan, and secure the passages into Syria and Mesopotamia, they would find serious difficulty in penetrating the central Kurdistan range; and

Lastly. It would be of great importance to the Turks to secure the possession of the plateau of the Rahwan and the head of the Bitlis

valley. As long as they held this position they could bring up troops from the south, and a force here would block the best route through the mountains, and would be in a position to threaten the Russian communications, whether they advanced westwards from Erzeroum or attempted to penetrate the Kurdistan range either from Mush or Van.

The CHAIRMAN: As there does not seem likely to be a discussion, it only remains for me to return our best thanks, in which I am sure you will all heartily concur, for this excellent and instructive lecture. In the course of it it has been evident that Major Clayton has brought to his task not only considerable local knowledge and great power of arranging it and presenting it to us, but also a degree of professional training and familiarity with strategical subjects, which could alone have enabled him to present to us so lucid a picture of the state of the case as now existing between Russia and Turkey. On the one side we have the great grasping power of Russia, with her numerous army, well appointed, well officered, well organized, resting on great cities and strong fortresses, with good roads to conduct it to the frontier; and on the other side we have the crumbling Empire of Turkey, without money, without men, without heart or hope. I can testify to the general truth of Major Clayton's picture, because I was the Commissioner appointed to represent Great Britain for the delimitation of this particular frontier. When, in accordance with the Treaty of Berlin, a Russian and a Turk were to meet here for the purpose, it was stipulated by our Government that a British Officer should be joined with them, chiefly to protect the interests of Turkey, because nearly all the preceding year had been wasted, in consequence of the persistent efforts of Russia to gain more advantages and more territory than the treaty gave her. I entered the country with my party at Trebizond, following the road which Major Clayton has briefly described—a road passing over formidable passes, very often for many miles together a mere notch cut in the precipitous sides of lofty mountains, and descending from thence for thousands of feet into close valleys, which, with the melting of the snows, were filled with roaring torrents, so that in the year I travelled there, nearly all the bridges were swept away, and our wagons had to pass these rivers by fords, going up and down the broken banks. I need hardly say how very precarious such a route must be for the support of an army operating at the other end of it. One chief object of my mission was to secure for Turkey the strong position of Zewin, and all the preceding year the Russians had endeavoured to encroach upon this position. However, it was secured to Turkey and still belongs to her; but I need hardly say that a position is of no great value without a suitable garrison, and to secure that position there ought to be a strong force permanently encamped there. I doubt very much, even supposing Turkey had the men, whether the country affords the means of maintaining that force at that particular spot. These circumstances show us how this unfortunate country has been going down hill since the most ancient times that we have any knowledge of; for we know that thousands of years ago Xenophon led 10,000 Greeks through this country: he went up by Bitlis, close to Lake Van, and traversed the country between Erzeroum and Trebizond, and although he could not scatter his forces in order the more easily to obtain supplies, because he was everywhere pressed by the barbarians and had to move in compact order so as to be always ready to fight, yet he has recorded that all along that line of road he found plenty of subsistence for his troops. It would be quite in vain to hope for anything of that kind now, and taking that fact, and also the many others which Major Clayton has laid before us, I think it must be evident that it is merely a question for Russia herself to determine when she shall overrun and annex a considerable part of this Turkish territory. Whatever reason we may have for wishing to make ourselves better informed on this subject in a scientific and military point of view, I think you will all admit that the labours of Major Clayton have given us ample means of studying the subject, and pursuing it to the best advantage.

Friday, April 27, 1883.

SIR THOMAS BRASSEY, K.C.B., M.P., Lord of the Admiralty, in the Chair.

MARITIME POWER AND ITS PROBABLE APPLICATION IN WAR.

By Captain R. H. HARRIS, R.N.

THE attainment of supreme maritime power has been jealously striven for, and dearly prized when attained, by nearly every nation that has had any pretence to a seaboard. But much as it has been sought and valued, and greatly as it has enriched, from time to time, those who have been its proud possessors, yet it has been at the most only a transient power, and its successive owners have, after a hard struggle to retain their mastery of the seas, usually been obliged to yield what they so much valued to some other powerful nation whose people have made a determined effort to secure maritime supremacy.

Hence, in spite of our undisputed possession for a long period of the greatest maritime power that has so far ever been created, it behoves us to narrowly watch every fact or circumstance connected with our navies, and to neglect no means that may help to ensure our being most thoroughly prepared to encounter with success any attack which might have for its object the destruction either of our Colonial Empire, or the enormous mercantile marine on whose untrammelled labours we are so dependent, and of which we may be so justly proud.

For have we not good reason for assuming that a serious reverse to our maritime power would in the first place almost immediately transfer our carrying trade to a neutral flag, and in the second place, if the reverse were not speedily checked by some decided success on the part of our fleets, that our small outlying possessions would soon become a prey to our enemies, and also that our vast Colonies, notwithstanding those feelings of loyalty or affection which might attach them to us, would, in their own interests, and for their own safety, feel compelled to declare their separation from a mother country which was no longer able to protect their sea coasts and shipping?

To be then thoroughly prepared to avert such a catastrophe it is surely needful that we should carefully ponder and consider what best constitutes maritime power in the present day. Replete with difficulty is this question,—to it must be given our utmost energy. Next in importance to this must be our knowledge of the most skilful manner of applying to war purposes those classes of vessels which for the time we may have assumed to compose our maritime power.

In these days the possession of such power may be, in a greater or

less degree, attributed to those nations who have the ability to send afloat a well-manned, well-found, and efficient force of powerful armoured or protected ships, with a corresponding force of corvettes, fast cruizers, and other vessels wherewith to satisfy their own national requirements in time of war. Against this, we may say that maritime weakness is with equal certainty to be ascribed to any nation which, without an adequate force of war-ships, has a large mercantile marine scattered all over the globe, with extended commerce, and possessing many outlying and unprotected dependencies.

From the above it may perhaps be definitely stated, and I believe generally accepted as a fact, that a maritime Power with small commerce on the seas, &c., has, at the outset of a war, far less to fear than her enemy, who, with an equal war navy, has a large and extended mercantile marine, &c. The latter has much to lose by defeat; the former has little to lose, and much to gain if victorious.

We may thus admit every unit of a mercantile fleet, with the exception of its fastest steamers, to be a national weakness in maritime war; also that every unfortified town or Colony on a seaboard is another weak point open to the attack of an enterprising enemy; but we may fully recognize every fortified seaport, more especially if it is available as a coaling station, to be a source of maritime power, and an unqualified strategical advantage. In it, cruizers could coal with rapidity and safety, merchant ships could be assembled to await convoy. A well-situated port of this kind could be utilized as a valuable base from which to carry on naval operations, both for the protection of our own or for the destruction of an enemy's commerce.

It has been well and sufficiently demonstrated by the American Civil War that the Confederate States, which could in no manner be classed as a maritime Power, found means during the course of their desperate struggle to literally destroy, or drive to the cover of a neutral flag, the whole of the large mercantile navy of the Federal States. And yet it must be owned that it was the maritime power of the Federal States, when more fully developed, which was the main cause of the eventual subjugation of those gallant Confederates. Is not this a lesson to ourselves, that however great our maritime resources are, yet we dare not delay the development of the power they give us until war is actually declared?

The geographical position of a country has naturally much to do with the position it occupies as a maritime Power. To an insular nation like ourselves, dependent on the foreigner to buy the manufactures which give employment to the many hands in our over-populated land, and, in return, to sell us the daily food, which our soil is incapable of growing for us, the necessity for great maritime power may be said to have reached its climax.

We must, indeed, acknowledge maritime power to be our very life as a nation; without it, our present mercantile prosperity and material wealth must inevitably dwindle to a much lower level.

If, however, supreme maritime power is a necessity for us, and entails some sacrifice on the part of our people to preserve it, does it not free them from that burden of universal conscription for military

service under which our continental neighbours continually groan? And at the same time does it not provide us with an unequalled scientific frontier, which we can extend or retract at our pleasure? While it rests solely upon the goodwill of the supreme maritime Power whether other nations shall trade freely on the high seas or not, can we with safety ever let such power slip away from us, and feel sure that a successor would continue to use it with the same justice and moderation which we can fairly place to our own credit?

Fortunately for the continuance of our national greatness, we have at our feet all the elements that are necessary permanently to secure it: we have an innate patriotism, a race of brave and hardy seamen; we possess the most skilful naval architects and engineers, in conjunction with abundance of all the materials necessary to construct, equip, and propel our vessels of war; we have coaling stations in nearly every part of the globe; and lastly, we have that noble inheritance, bequeathed to us by the traditional valour of our forefathers, a naval prestige that has hitherto been unequalled in the annals of the world. This being so, surely the decline of our maritime power can only result from some extraordinary neglect in its proper application on our own part.

Let us then never lose an opportunity of considering how we can best consolidate and preserve this power, which under God's providence has been the true source of our national prosperity. Our task is no easy one. For years past, nation has been striving against nation with ceaseless ingenuity, as to who shall build or acquire the most powerful vessels of war. It is this strife which has resulted in a constantly increasing thickness and strength of protective armour, with its often varied and more skilful adjustment, in the extraordinary growth in the size and power of guns, in the introduction and rapid development of torpedo warfare,—it is this which has added to the war-navies of the world an almost infinite variety of vessels, differing most essentially from each other in type, size, class, speed, and power. Each design possesses some particular feature which renders it, as the case may be, either weaker or more powerful than some otherwise corresponding vessel; indeed, it has become a momentous question for the naval administrators of to-day how they are to best expend the money placed at their disposal by their country, so as to ensure it being converted into those vessels which will give the greatest possible amount of maritime power; and it becomes an equally momentous question for the seaman how he is most advantageously to employ the ever-varying engines of maritime war with which he is entrusted.

I therefore venture to think that an attempt on my part, however feeble it may be, to group some of the varieties of war vessels, with the object of bringing their powers, and, generally speaking, probable application, under discussion in this Institution, will not need any apology.

It is manifestly impossible, however, in the time allowed for a paper of this kind, to name and discuss the numerous varieties of vessels in detail.

I should wish here to mention for a moment what has especially induced me to read this paper: it has been the numerous thoughts

which occurred to my mind during the reading lately of the paper entitled "Battle-Ships, a Forecast," by Mr. Barnaby, in this theatre,[1] and the discussion which followed, but more particularly by the carefully prepared and thoroughly instructive diagrams, in the use of which Mr. Barnaby gave so much point to his remarks.

By their aid the comparative maritime power of nations could be seen and comprehended at a glance, and I feel sure that many of my brother Officers who were present must have been, like myself, somewhat awestruck at the comparative magnitude of our commercial marine, and at the same time impressed with a sense of the terrible responsibility which may possibly some day, in great measure, rest upon themselves of giving due protection to such a large preponderance of helpless merchant shipping.

In the course of his remarks Mr. Barnaby fully directs attention to the many conflicting difficulties which the naval architect has to reconcile, and in his concluding remarks he states that "the questions raised in his paper which seem to be debatable are—

"1. Should England build ships greatly exceeding, in speed, coal-endurance, guns, and armour, existing ships of the first class, regardless of size and consequent cost?

"2. Will not the enemy's ports require to be attacked and blockaded, notwithstanding the torpedo? and, if so, what description of ship will be suited for this attack?

"3. Ought regular ships-of-war to be built of sufficient power and speed to capture ships like the 'Servia' and 'Alaska,' and their larger and faster successors? or should we not rather look to the services of such ships for the work, endeavouring to fit them for it?

"4. When the powers of the ram and the torpedo come to be tested in actual warfare between two Great Powers, what part may we expect to be assigned to the fast gun and torpedo ship with protecting deck, and the merchant auxiliary, as a result of these contests?

"5. Ought the battle-ship of the first class to carry guns of the largest calibre which can be made and worked? or should we be content to allow the gun to progress slowly with the advance of the armour?"

Let me frankly admit that a direct and positive answer to these questions is more than difficult—it would be mere egotism on my part did I attempt so to answer them; yet I hope that this paper, which by your kind permission I now have the honour to read, may, by inducing further discussion, be the means of helping to ventilate, if not to partly answer, these five questions which have been propounded for us by Mr. Barnaby.

In every discussion of this sort, concerning the actual elements of our maritime power, we may at least hope to derive some benefit or instruction, even if we cannot absolutely determine what best constitutes it, or lay down any hard and fast rule as to its probable application.

Solely then for the purpose of approaching our subject, permit me

[1] Journal, vol. xxvii, No. CXIX.

to temporarily separate our war-vessels into classes, irrespective of the fact that several of these classes, so selected, are capable of being employed in conjunction with one another to their mutual advantage.

1st. Sea-going armour-clads or protected ships capable of a sea-going speed of 12 knots.
2nd. Sea-going armour-clads or protected vessels of less speed.
3rd. Armour-clads not sea-going.
4th. Frigates, corvettes, and sloops.
5th. Armed merchant steamers of high speed.
6th. Gun-vessels, gunboats, and despatch vessels.
7th. Torpedo vessels and boats.

I separate the armoured vessels, and in the first place select those of 12 knot speed for this reason.

There is no greater truism than that the speed of a fleet is governed by the speed of its slowest ship; hence, to deal a bold and decisive stroke for the mastery at the very commencement of a naval war, such a blow must be struck by swift vessels: the delay of having to wait for a slow ship or two might be fatal to the best laid plans of an Admiral who was desirous of closing with his enemy.

It would indeed be a terrible thing for the Chief of a fleet to have his enemy in sight, and while burning with ardour to engage them, yet be unable to do so, through simple lack of speed.

Any higher speed than 12 knots would be most advantageous could it be attained. With the swiftest vessel, or the swiftest fleet, lies the option of giving battle or declining it, of choosing when and where to fight, of electing whether the battle shall at first be limited to artillery alone. Changes of wind will not, as of yore, influence the combatants; there is no weather-gauge to strive for.

Let us for a moment realize the importance to ourselves of a naval victory won in the early days of a maritime war, and also reflect on the disastrous consequences sure to ensue, both to our shipping and Colonies, if this battle could not be fought, or were unsuccessful. A victorious sea-fight on the first outbreak of war, or our enemy driven into port and blockaded, we should be at leisure to develop, and bring into play, the enormous latent maritime power which it is our good fortune to possess.

Promptitude in maritime war will ever be our greatest national economy.

It may be asked, Why do you not designate or select any particular type of armour-clad or protected vessel, with which to compose this 12-knot fleet? I would reply that I have no intention of doing so, independently of any personal bias or opinion I may have as to the merits of certain vessels, and, apart from special qualifications or defects, I regard all armoured vessels, capable of manœuvring at 12 knots speed, as important adjuncts to any fleet. We are not justified in presuming that a fleet battle of to-day would be lost or won by artillery alone; on the contrary we have ample evidence that the impact of the ram, and the shock of the torpedo, must play a very important part during the *mêlée* which must surely ensue during a hotly contested naval action. Certainly, then, if the power of individual

ships consists of artillery, ram, and torpedo, and that either arm may be used with success, we must not disqualify any vessel from the fight by reason of her being inferior in gun power, or protective armour; for granting that she is the inferior of some in these respects, yet may she not be the superior of many in the employment of the other weapons?

In the single combat of armour-clads it might be different; there, in addition to speed, the weight of metal thrown, the angle of training of guns, the strength and position of protective plating, may all be fairly taken into account before the ram and torpedo—the same of course in an attack by armour-clads on forts and batteries; but in the fierce heat of an actual sea-fight, fleet or squadron attacking fleet or squadron, then may we partially neglect the number and weight of guns and the strength or skilful adjustment of protective plating, and assume, providing the speeds be equal, that the more numerous fleet will have the greatest advantage.

The French Rear-Admiral Aube, in his celebrated article on Naval Warfare, &c., says: "*A fleet superior in numbers will be, from the commencement of hostilities, mistress of the seas;*" and "*The empire of the sea, in the strict meaning which we must give to those words in the present day, belongs to the most numerous ironclad fleet.*"

It would thus seem that the safest means of preserving or acquiring maritime power on the part of any nation will be, not to split too many straws over the individual capabilities of certain vessels, but to take care that there be no deficiency in numbers of moderately capable vessels all possessed of good speed.

Can anybody positively state that a force of ten armoured vessels of the very first class, which may be fairly valued at seven or eight million pounds sterling, are the equals in a sea-fight of fourteen or fifteen armoured vessels of the second class, of the same speed, and also valued at the above sum?

To carry our argument a few steps farther, and look ahead a little more than it is perhaps quite wise to do, let me ask if the same ten first-class armoured vessels are the equals of five armoured vessels combined with fifteen or sixteen protected torpedo and gun vessels, all of equal speed and of the same equivalent value?

Here we have twenty-one ships against ten; we presume all the speeds to be equal; we acknowledge that the torpedo power of each vessel may be the same, and the proportion of ramming power also to be twenty-one to ten. Is it not possible that the superior gun power and armour-plating may be insufficient to counterbalance the disproportion of the other weapons?

The above argument is of course capable of being carried to a much greater length in the same direction, and it will still be favourable to the more numerous vessels.

It would, however, be unfair to armoured or protected vessels of the "Lepanto" type to deny the advantage their extreme speed and unequalled power will give them in single combat, or to question the great strategical power they possess, when attached to a fleet, of bringing to action the sternmost vessels of an enemy who was bent on

declining battle; but the possible easy disablement of such costly monsters of the deep, by vessels of insignificant size and comparatively trifling cost, should make the most thoughtless reflect as to the wisdom of placing too much dependence on, or being content with, a navy composed of a few such Leviathans.

It seems more than probable that if in the immediate future any fleet-battles have to be fought, they will be contested on the old historical naval battlefields, either in our Channel, the Mediterranean, or in the waters of the West Coast of Europe; the want of adequate coaling stations will forbid our possible foes from quitting these seas. A stray armour-clad or two may have to be encountered further afield, but I do not foresee any possibility of the repetition of a long chase, like Nelson's pursuit of a French fleet, to the West Indies and back.

It is self-evident that in an engagement, either between squadrons or single ships, the squadron, or ship with the highest speed, will always have the choice of position in which to commence an action, and in the first place also have the option of confining the fight to artillery. The faster vessels, or vessel, can, by selecting a retreating action, always keep out of the way of the torpedoes or ram of slower antagonists. I do not wish to recommend such a manœuvre, but we may find our enemies resort to it, until, proving artillery insufficient, ram and torpedo would be employed.

Any ship having a preponderance of 2 or 3 knots speed over an enemy could, in single combat, after manœuvring for a retreating action, have the advantage, by repeatedly yawing, of delivering broadside after broadside into her enemy, who, while vainly striving for closer quarters, has only the use of such guns as she can fire right ahead.

We have few actual data upon which to construct in imagination the fleet-battle of to-day; but there are a few facts which may help us to gather an idea of what is most probable.

One thing we know is, that the complete independence of wind and weather which steam has given us renders it almost impossible for two hostile fleets to blunder suddenly into sight of each other. We may know also that the tactics of the Nile or Trafalgar are equally impossible: no enemy of the future will await our attack, either at anchor or lying to at sea.

We may reasonably expect that two hostile fleets, having decided to submit their destiny to a battle, will mutually seek each other under the cover of widely extended look-out vessels, which vessels on meeting will gradually be forced back on one side or the other, signalling the information of the enemy's approach.

Should both fleets be equally courageous, and determined to dare the closest battle, then it is apparent that they must face each other, and for a time pass and repass through each other's formation, endeavouring the while to deal destruction with ram, gun, and torpedo, the uninjured reforming again as quickly as possible to repeat their charge with similar intent—continuing thus until an excess of casualties, or a weaker courage, had reduced this terrible combat into a *mêlée* or a flight.

But should one of two hostile fleets, meeting, feel confident in their artillery, and at the same time possess a superior collective speed to their adversaries, then its Chief may manœuvre, as I have before hinted, to limit the action to artillery alone; this may be successful for a time, but it must, should the slower fleet determinedly insist on closing with their enemy, eventually come to a pursuit. Matters having reached this stage, we may suppose that the Chief of the pursuing fleet unable to close bodily with his foe, will advance his fastest vessels to bring to close action the sternmost ships of the enemy: this strategy, if at all successful, would probably result, as before, in a *mêlée* as already described.

In these latter moments of the sea-fights of the future, a very prominent part will, I believe, be taken by swift rams and torpedo vessels; when the fury of armour-clad is concentrated on armour-clad, amidst the roaring of escaping steam, and the din and confusion of a heavy fire and its consequent clouds of smoke, then will exist the opportunity for small swift vessels to wreak destruction upon their larger foes: it is in these moments that numbers will tell more than individual strength.

In single combat, a fast ship need never be rammed by a slower ship,[1] but if the steering powers are equal, the faster vessel may always ram the slower vessel. In ships of equal speed, the ship of the best turning power can always avoid the ram of a more unwieldy vessel.

As Whitehead torpedoes can now be ejected from vessels to travel at the speed of 20 knots for a distance of 200 yards, they may, in a measure, be said to flexibly extend the ram to that distance.

A torpedo, towed astern of a vessel that feared being rammed by a handier vessel than herself, would be a great safeguard; the Captain of the ramming ship would naturally fear that a frustrated attempt to ram his adversary might carry him over the torpedo astern of her.

The next element in importance to fast sea-going armoured vessels would be their slower sisters; these will be assembled and hurried off in the wake of their faster comrades, whom they must support and reinforce, as much as their speed will allow, or form a reserve on which the fast vessels could fall back.

In a closely contested fleet action, the early appearance of a reserve on either side would decide the battle. At the end of a successful sea-fight, we know not how many of the victors may be able to keep the sea; but we do know that the consequent damages to ships, from gun, ram, and torpedo, must at the least be a matter of tedious repair, either in dock or basin.

It is not probable that armour-clads will be employed as blockaders in the immediate vicinity of ports known to contain torpedo vessels, more especially at night; on the contrary we may suppose that the actual blockade will be conducted by lighter and swifter vessels, who being cognizant of the daily position of the armour-clads to whom they are attached will repeatedly communicate with them, keeping

[1] See Captain Philip Colomb's Prize Essay, 1877, "Gun, Ram, and Torpedo."

them apprised of any movements on the part of the blockaded. In some blockades an opportunity may be afforded the blockaders of establishing themselves in an adjacent harbour, and using it as a base for their operations.

It is difficult to say what would be the first application of non-sea-going armour-clads at the outset of a purely naval war: except for the protection of harbours (where their mobility would certainly render them more valuable than fixed forts), their duties would be limited; but when the first blow had been struck home, and a blockade established, then the dormant aggressive power of these ships might be brought to the front, and they may be wisely employed to bombard an enemy's forts in preference to their faster and much more costly companions in arms.

We should remember, in estimating maritime power with regard to any of the vessels hitherto mentioned, that what the power is at the commencement of a war so it will remain: it may diminish, but not increase; the long period required to construct and engine an armoured ship precludes the possibility of a ship being laid down and sent afloat during the course of a modern war; it may also be confidently assumed that the complicated machinery of a war-ship will require frequent repairs, and it is next to hopeless to expect all such vessels to be continuously efficient under the severe strain of actual war service.

With the view of developing the full maritime power of a squadron or fleet of armoured vessels, it is necessary that they should be largely supplemented by vessels of other types. The paper I had the honour of reading in this theatre last June[1] enters more fully into this matter than I can have time to do this afternoon, but I hope it may be sufficient if, in the course of my remarks on unarmoured vessels, I mention those which are, in my opinion, most suited to supplement an armoured fleet or squadron.

Frigates, as known in the olden days of our naval supremacy, can now hardly be said to exist, though indeed all our earliest armour-clads were denominated frigates. Yet they were undoubtedly built to take the place of line-of-battle ships; therefore, apart from armour-clads coming under the denomination of frigate, though carrying their guns on the broadside and principal armament on the main deck, we may name the "Shah" and "Inconstant" as types of the frigates of the day. These magnificent ships are, however, not likely to be used in any number in the maritime wars of the future: the expense of their construction is great, and it seems hardly justifiable to leave such large and costly ships without some protection for machinery and guns.

Their place will probably be taken by fast and powerful corvettes.

In estimating the maritime power of any nation, a sufficient force of these vessels must rank next in importance to a well found and sufficient force of armoured vessels.

It will be hardly possible to enumerate all the war services that will be required from corvettes in time of war: they must be the eyes of an

[1] "The Necessity of Supplementing Armour-clad Ships by Vessels of other Types." Vol. xxvii, No. CXIX.

armoured fleet; they must drive the cruizers of an enemy off the seas; they must unceasingly pursue, capture, or destroy the merchant shipping of an enemy, wherever it is to be found; they must be stationed as guards on those spots where, from natural causes, our ocean highways narrow; in those regions where during passages our merchant shipping is wont to congregate, there too must be the cruizing corvette.

This class of vessel will have to be constantly seen off our important colonial harbours, to give confidence to the inhabitants, and to deter the enemy's cruizers from attempting to lay tribute on seaport towns.

To get a full idea of the manifold duties that will be thrown upon our corvettes and cruizers during a severe naval war, it is necessary to refer to the truly admirable paper on "Naval Intelligence and Protection of Commerce in War," read by Captain J. C. R. Colomb, in this Institution (see Journal, vol. xxv, No. CXII).

The greater part of these duties could be effectively executed by corvettes of from 12 to 14 knots speed; but for the look-out duties first mentioned, and for capturing the fast cruizers that might be employed by an enemy, corvettes of a higher speed are necessary.

As the services of corvettes are of the greatest importance at the first outbreak of a maritime war, it is evident that they are an element of maritime power, the construction of which cannot be delayed until a war is expected or declared, not even if it is a fact that the rapid strides naval architecture is making will render many of them obsolete before their services are required for war purposes.

Their extreme value in a dilemma would amply reimburse the cost of constructing those corvettes whose best days may have gone by during an era of peace.

The one great necessity of corvettes in war will be coal: constant cruizing and pursuit will soon empty their bunkers; an adjacent coaling station will be to them a source of continual strength.

If a class of sloops could be constructed of sufficient speed and coal-carrying capacity, many of the duties which I have just relegated to corvettes might be economically assigned to them; but, so far, I fear this class of war vessel does not exist; the majority of our own sloops, though they may be eminently fitted for police duties in foreign waters, during peace, or for doing battle with a barbarous country, yet, in actual war with a civilized and enterprising nation, would be found too slow, either to efficiently protect our own commerce or destroy that of an enemy.

In our large and magnificent merchant steamers of high speed, of which, when compared with other nations, we rejoice in such a happy preponderance, will be found another large element of maritime power well within our grasp.

The wisdom of our Admiralty in preparing armaments for these fine vessels cannot for a moment be contested; in their own interests alone, even if not required during a war, to assist the Royal Navy, the mere fact of these vessels being armed would prevent their falling

an easy prey to similar swift vessels, which might be employed by a foe to attack our commerce.

Their high speed and vast steaming capacity would render two or three of them, if attached to an armoured fleet, most invaluable allies.

If we happened to be at war with some nation which was so much inferior to us, in actual maritime power, that her only chance of successfully injuring us afloat would be by endeavouring to destroy our mercantile marine by fast steamers, in this case we could well afford to hunt down each of the vessels so employed, with two or three of our own armed merchant steamers, and thus speedily terminate their career.

But it is well that we should guard ourselves from falling into the error of supposing that these vessels are capable of successfully engaging the war-built vessels of an enemy: their weak structure must always effectually prevent such a thought.

It is also well to remember that should we ever have the dire misfortune to meet with naval reverses, then these fast steamers would be the only sure means of supplying our teeming town populations with daily food, and they could hardly be diverted from this important service for war purposes.

We may fairly assume that fast steamers like the "Alaskas" and "Servias" of our mercantile navy could run cargoes from port to port with almost perfect immunity from capture, while our immense fleet of slower steamers would have to change their flag, or be compelled to undergo and endure the delay of being convoyed.

The importance of keeping open our high road to India and the East *viâ* the Suez Canal cannot be denied; should it, however, be threatened or attacked we must rely on our fast steamers for keeping up a rapid line of communication *viâ* the Cape of Good Hope. Indeed, in the event of war with a Mediterranean naval Power, it appears to be desirable that a portion of our trade with the East should be at once so diverted.

The "Servia" and "Alaska" of to-day and their improved sisters of to-morrow are capable of steaming from Plymouth to Bombay *viâ* the Cape under thirty-five days, allowing them five days of this period for coaling and unavoidable detention on their passage.

In gun-vessels, gunboats, and despatch vessels is comprised another element of maritime power; it is needless to say much about the latter vessels: they, as their name implies, would be principally employed during war in carrying despatches with rapidity and keeping up the communication of fleets; many vessels capable of these duties would be easily obtainable by us in war, and torpedo vessels and boats will also be available for this service.

The function of the gunboat proper, in the ordinary sense of the term, is during times of peace to economically represent the national flag in foreign ports, up rivers, and shallow harbours which are unnavigable by larger craft. Many and important are the services they thus render to this country; but for ocean service, such as the protection or destruction of commerce, they appear to be next to

useless: sailing vessels would be their only prey, and the fast cruizers of an enemy would always avoid engaging them. These vessels, when belonging to the weaker of two belligerent naval Powers, would probably, during the course of a war, seek the shelter of a neutral port.

Gunboats of the "Staunch" class may be regarded as useful vessels for the defence of harbours, where their heavy guns and light draught of water would be of great service; a combined attack by a number of these craft on an enemy's forts would be very formidable.

But apart from these ordinary types of gun-vessels and gunboats, with which we are familiar, a larger, faster, and much more powerful type has been found possible, and it is likely to be generally introduced as a new element of maritime power. Such vessels were described by Sir William Armstrong in his address upon our national defences; their performances are well known, and have been often quoted: with a displacement of 1,300 tons they have a speed of 16 knots, and are armed with two new type 10-inch guns, capable of penetrating 18 inches of iron armour.

We may be sure that we shall not rest here, and that the designs of these vessels will be much improved upon: their high speed, heavy guns, and torpedoes will be a serious menace to the powers of armour-clads; and an armoured fleet supplemented by vessels of this character will have its offensive powers developed in an extraordinary degree. On the able application of this sort of vessel in conjunction with torpedo vessels, must armoured fleets rely for the efficacy of their blockading powers. The immense cost of our present armour-clads, and their limited number, will never admit of their being unnecessarily pitted, under, perhaps, disadvantageous circumstances, against comparatively ignominious, but none the less dangerous foes. So we may say, when it is wise to withdraw the blockading armour-clads from the vicinity of a blockaded port, then will it be necessary for the swift gun-vessels to close in and freely risk their own existence, to ensure a proper observance of the blockade, or to give timely warning of a sortie.

It would need a separate paper to enter fully into the momentous question as to the effect on maritime power, and its application, of the general introduction of locomotive and stationary torpedoes, or of torpedo vessels; these latter, and the rapid strides we may expect them to take in the next few years, seem to me the maritime question of the day. It is even possible that armoured vessels of large size may at some future time completely succumb to greater developments of torpedo vessels. In the present it will certainly be most judicious to largely supplement armoured fleets, by both torpedo vessels and boats, each armed with Whitehead torpedoes;—the torpedo vessels to be capable of independently keeping the sea; the torpedo boats to be attached to the armoured vessels, or carried by steamers like the "Hecla" fitted as torpedo depôts.

There can be devised no more effectual way of harassing an enemy's coast than by repeated torpedo attacks on his harbours, and the power which such a ship as the "Hecla" would have of repeating these attacks on ports, perhaps some 200 miles apart, one day after

another, and always where least expected, could not fail to exercise a demoralizing effect on the most obstinate foe.

Many valuable opinions have been freely expressed, that torpedo warfare will be of more benefit to defensive than offensive operations. This may have been so at first, but it now appears probable, from recent progress, that in due course, apart from the bugbear which stationary mines must always be to huge and costly vessels, torpedoes will be fully as effective weapons in the hands of the assailants as they have hitherto been reputed to be in those of the assailed.

Stationary mines are of equal use to block a foe in a port as to keep an enemy out of it, and in the wars of the future we may in great measure expect torpedo attacks to take the place of those gallant cutting-out expeditions for which our naval ancestors were so famous.

With regard to the fifth question which Mr. Barnaby has given us, like the others it would be difficult to satisfy it with a direct or short answer. However, in estimating the size of gun with which to arm ships of the first class, it is important to remember, what past experience has undoubtedly shown us, *i.e.*, that light guns and slow ships soon become obsolete, but that fast ships and heavy guns have a much longer life of usefulness; fast ships, if lightly armoured, yet mounting heavy guns, are always the equals of other ships which have more protection, but less gun power. And again, where heavy armour would be useless, gun power is the best defence against attacks of torpedo vessels and rams; to my mind it is better to have a ship well armed than well protected.

In conclusion, I would say that I venture to think there is no cause to tremble now for the future of our maritime power, any more than there was when the transition of our fleets from sailing ships to steamers was imminent; then we can remember frequent predictions, both at home and abroad, that the introduction of steam was to end our maritime supremacy, and that by it we should be brought on the same level as those peoples who are naturally less maritime than ourselves.

So far we may well congratulate ourselves on the falseness of these predictions; and if the next transition of our fleets should be from a few monster armour-clads to vessels both smaller and swifter but much more numerous, then again, I think, provided we are true to ourselves, that we may still look hopefully forward to a long continuance of that great maritime power which has made our nation the subject of the mixed admiration and envy of the whole world.

Admiral Sir ERASMUS OMMANNEY: Much credit is due to Captain Harris for this very comprehensive paper. It deals with many questions, each of which might give rise to a long discussion; but on the whole, I think, naval Officers generally will very much approve of it. I am glad to see that he contends very strongly for speed. Speed is one of the greatest elements we require for our hostile operations in future. I think I gathered that he limited battle-ships to 12 knots, but I think we ought not to contend for less than 14 knots at the present day. There is only one observation that I should wish to make with regard to increasing our naval force,—the method is somewhat indirect, and at variance with free trade principles,—but my idea is to prevent the construction of ironclads in this country for foreign Powers. As soon as we construct a war-ship of super-excellence, we see the engineer

skill of this country building something surpassing it to supply foreign nations with. The subject is one very difficult to handle, but still we always have that to contend with—that is, that we are supplying foreign nations with the means of assailing ourselves. I think the paper is very valuable, and there is little that I desire to comment upon in a critical spirit.

Mr. RAVENHILL, C.E.: I feel somewhat diffident in rising in this Institution and in the presence of an assembly of naval Officers; but I venture to do so, being anxious rather to draw your attention to what I take to be our great weakness, viz., our commercial steam marine. Mr. Barnaby, by his very interesting paper and instructive diagrams, I believe, set many gentlemen who heard him thinking about the weakness of it, who, perhaps, had never given much thought to it before. He showed us in one of his diagrams, a small block, representing the number of merchant vessels having a speed of 14 knots and upwards on the Admiralty list, and it occurred to me that it might be interesting if an endeavour were made, and I have ventured to make it, to subdivide his large square block of steam-ships, so that you gentlemen should know the class of vessels employed, particularly in carrying cargoes to and from our shores at the present time, and it would be those vessels that you might be called upon to convoy and protect. The data I have worked with is based on the Parliamentary Return issued only two days ago, viz., the Annual Statement of the Navigation and Shipping of the United Kingdom for the year 1882. Of the vessels employed in the Home trade I find 1,402 vessels under 1,000 tons; those, no doubt, are principally employed in the coasting service, and many will continue in that service unless we entirely lose command of the sea. Those 1,402 vessels represent a displacement tonnage of say 373,188 tons. Coming to the Home and Foreign trade, I find that under 2,000 tons, which appears to be the limit of size employed on such services, there is a total of 305 vessels with a displacement tonnage of say 218,379 tons. In the Foreign trade, which includes all those of 2,000 tons and upwards, there appears to be a total of 2,470 vessels, with a displacement tonnage of say 4,129,012 tons, giving therefore a gross total of all classes of vessels of 4,177, and a displacement tonnage of say 4,720,579. The accompanying combined diagrams and tables show you the relative tonnage in the form of rectangles, and the number of vessels in their respective classes. Captain Harris alludes to fast vessels, such as the "Alaska" and the "Servia," and the possibility of their services being required for supplying our daily food, &c. The Admiralty have, apparently, to a great extent, absorbed these 14-knot vessels, because in Mr. James Dunn's paper on Bulkheads, read at the last meeting of the Institution of Naval Architects, he stated there were 157 vessels qualified on the Admiralty list. Now, there are only about 209 vessels in existence above 2,000 tons, and therefore the grave question would arise, Can the commercial steam marine stand the loss of the services of these 157 vessels? There were other points upon which I should have wished to address you, but I am reminded I must not occupy more time.

Admiral GORE JONES: I should like to make a few remarks on one special point. All through this very thoughtful paper which Captain Harris has read to us, and for which we are exceedingly obliged to him, there is one word which occurs oftener than any other, and that is "speed." The coal-carrying has been carried to the utmost excess in ships to try and get continuous speed, and, no matter what the size and capability of the ship, the one thing we all demand is speed. Now there is one element which recent experience has brought particularly to my mind, and that is the absence of docking power for England in the world generally, wherever she has got work to do. I was on the Indian station, and there is not a single dock in the whole of our Indian Empire that would take a first-class frigate or an ordinary troopship, and ships are constantly coming home from India without fans, and otherwise incapable, through the fact of not having a single dock. Now, to keep up speed, an ironclad requires to be docked at least every six months, and if she is not docked, she loses her speed completely. In the "Euryalus," my flagship, I could go 17 knots over the ground, with a clean bottom; and when she was six months old, or foul, I could only go 13, and that with difficulty. Now, as I see a Lord of the Admiralty in the chair, I should be very glad to bring this point particularly before you, because it is one of far greater importance than the

NUMBER OF STEAM VESSELS with their Displacement Tonnage (exclusive of River Steamers) actu
the Home and partly in the Foreign, and in the Foreign Trades respecti

Number of Vessels.	Displacement Tonnage.		
21	108,166	A	3,000 tons register and upwards.
61	249,150	B	2,500 to 3,000 tons register.
127	420,570	C	2,000 to 2,500 tons register.
256	651,958	D	1,500 to 2,000 tons register.
124	850,970	E	1,200 to 1,500 tons register.
390	643,890	F	1,000 to 1,200 tons register.
469	629,224	G	800 to 1,000 tons register.
216	253,081	H	700 to 800 tons register.
227	220,231	I	600 to 700 tons register.
224	184,118	K	500 to 600 tons register.
299	202,113	L	400 to 500 tons register.
230	121,664	M	300 to 400 tons register.
212	80,541	N	200 to 300 tons register.
280	61,158	O	100 to 200 tons register.
229	24,938	P	50 to 100 tons register.
512	18,504	Q	Under 50 tons register.
4,177	4,720,579		GROSS TOTAL.

The Diagrams show the T
Tonnage of t

IN THE HOME TRADE.

Number of Vessels.	Displacement Tonnage.	
7	9,298	G
8	8,857	H
24	23,065	I
58	47,448	K
119	80,175	L
120	63,879	M
136	50,854	N
222	48,936	O
211	22,768	P
497	17,908	Q
1,402	373,188	GROSS TOTAL.

PARTLY IN THE HOME AND PARTLY IN THE FOREIGN TRADES.

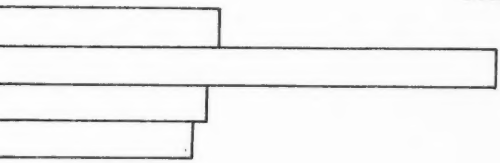
Number of Vessels.	Displacement Tonnage.	
7	10,374	D
2	3,988	E
2	3,249	F
8	10,522	G
15	16,746	H
48	46,701	I
54	44,116	K
61	40,974	L
44	22,756	M
32	12,655	N
23	5,307	O
7	907	P
2	84	Q
305	218,379	GROSS TOTAL.

Number of Vessels.	Displacement Tonnage.	
21	108,166	A
61	249,450	B
127	420,570	C
249	641,584	D
422	846,982	E
388	640,641	F
454	609,404	G
193	227,478	H
155	150,468	I
112	92,554	K
119	80,964	L
66	35,029	M
44	17,032	N
35	6,915	O
11	1,263	P
13	512	Q
2,470	4,129,012	GROSS TOTAL.

NOTE

Harrison & Sons Lith. St Martins Lane W.C.

teamers) actually employed belonging to the United Kingdom in the Home Trade, partly in
rades respectively, remaining on the Register, 31st December, 1882.

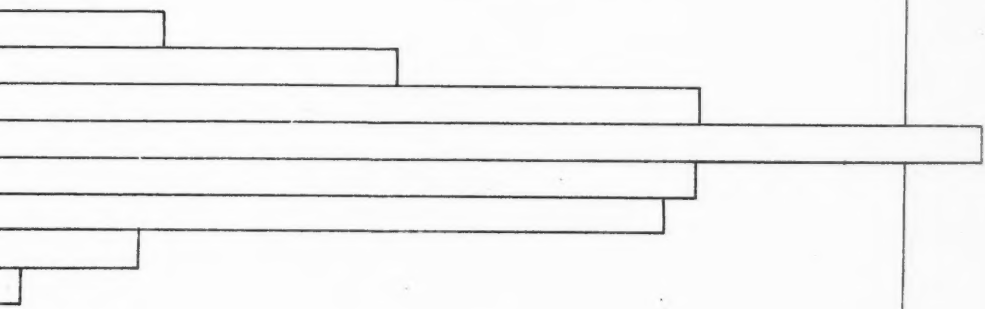


ams show the Total and Relative Displacement
Tonnage of the several Classes.

NOTE.—Attention is drawn to the relative proportion of Displacement Tonnage in their respective Classes, but more particularly to those from 800 to 2,000 tons register, and the very large number of Steam Vessels afloat belonging to them, having an aggregate Displacement Tonnage of 2,776,042 tons out of a total belonging to all Classes of 4,720,579

These vessels, if under steam in a Convoy could not be taken to have an average ocean speed of more than about 8 knots per hour.

IN THE FOREIGN TRADE.



NOTE.—For the relative proportions of the Diagrams these Displacement Tonnage of a Vessel is taken to be one-and-a-half times the Registered Tonnage.

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manufacturing of engines or carrying coal. A vessel with a foul bottom cannot have speed, and consumes a much larger quantity of fuel, and therefore I would particularly call your attention to the absence in India of an ordinary dock capable of taking even a first-class frigate or a troopship.

C. Pfoundes, F.R.G.S., &c.: The possibility of successfully applying our maritime power in time of war depends far more upon the brain and muscle that guides and controls the units of that power, than upon the type of such units of guns and ships. Therefore I would ask to be permitted to make a few brief remarks on this; for, although it has not been dealt with in the able paper before us, the question of the *personnel* is really at the foundation of all maritime power. With 45,100 men in our navy, Coast Guard service, and Indian troopships, 12,400 Marines, and a Reserve of nominally 18,000, we have only some 1,300 or 1,400 Volunteers (R.N. Artillery). We have in the shipping clearing from home ports, also, some 200,000 men, British and alien, in which we find nearly one foreigner to every five Englishmen, and of the 50,000 in those on colonial and foreign coasts, there are many entire crews of Lascars, Chinese, Kroomen, Kanakas, &c. Foreigners are permeating our service as Masters, and to a greater extent as Mates, and I confess I strongly resisted, at the Shipmasters' Society recently, these aliens entering our British Shipmasters' Society. The decline to five men per 200 tons (about one-half the proportion, before the age of big ships) is most marked. It is true there are many small vessels in our Colonies, and some 12,000 of them at home, of an aggregate of over 1,000,000 tons, with say 40,000 men, or an average of 80 to 90 tons and three to four men each. There are also, *on paper*, 12,500 indentures, but these are officially stated to be practically cancelled. The replies of the shipowners (*vide* Blue Book) to the inquiry of the Greenwich School authorities, exhibit a deplorable state of affairs; boys are refused on all sides, by many owners absolutely and altogether, whilst others demand high premiums, and almost prohibitory conditions are exacted. Is it to be wondered, therefore, that in thirty years the percentage of aliens has risen from 3 to 16 per cent. of our crews? So the question is, Where are our seamen of the future to come from? We cannot even now depend upon getting them, for our ships-of-war, from the Mercantile Marine. If we would but consider the standing navy, in whatever form it may be made to assume from year to year, on a peace footing, as the nucleus of our possible requirements for war purposes, Officers and men, and youths, could be maintained in large numbers, and in a high state of efficiency as to seamanship, gunnery, &c.; and most economically elsewhere, than on board of costly, huge, ironclad machines. On this point I must not now enlarge; the last few numbers of this Institute's Journal, and that of the British Association, contain my views, based on special personal observation amongst seamen in many parts of the world. Not a few distinguished and experienced Officers hold, I am glad to say, similar opinions. We cannot remain as we are till a war is actually imminent. The national naval spirit and gallantry, exhibited even in the mercantile seaman of the past, must not be allowed to fade for ever from amongst us. Else, where will our seamen come from? for we cannot denude our valuable merchant ships of their best men, by suddenly calling up the Naval Reserve. Good trustworthy men for the look-out, and capable helmsmen, are too scarce; there is a great difficulty in obtaining able seamen; so we must call into existence some means of cultivating a wider area to select seamen from. We must have Volunteer Blue Jackets, even more numerous than our nominal 200,000 Riflemen, &c. Manning our ships at home (*vide* my paper at British Association, Southampton), and also in the Colonies, is the really important question. This is an Imperial responsibility, and a national duty; we owe it to ourselves, and to our kin across the sea; and we must fulfil this duty. We shall be met more than halfway, right royally, by our loyal Colonial compatriots. We cannot copy the French maritime inscription, but surely we may find out and adopt a better method, and one more efficacious. We must not only encourage the building of better merchant ships, without in any way unduly checking or interfering with shipbuilders and owners. We must also, and above all, speedily inaugurate steps to encourage the shipping and maintenance of a better class of men for the crews, and the placing on a more satisfactory footing every way. our merchant marine, and it would be criminal neglect upon our part did we solely rely upon our present sea-going fleet of war-ships. More local ships,

that may be used for training and rendezvous, are wanted. There is, again, this risk: our astute enemy might buy up many of our very best ships before we knew it; but could not this be, to a certain extent, precluded? And what we would have to pay as bonus—say for right of purchase, or as subsidy—might be reimbursed us by certain privileges, as to the use of them for training a certain number of junior Officers, seamen, and youths. It is not heavy, obsolete, pattern guns that should be put on board these vessels, but light guns of long range, and a high, penetrating potential. Self-defence may have to be provided for, but not necessarily at close quarters, as in the case of our fast ships meeting a more powerful enemy. Then questions as to condensation of fuel, utilization of products of mineral fuels, economy in firing up (stoking), moderating speed unless when absolutely necessary to put forth full energy, and thus fleet vessels can be economically worked. The Russian purchases during many years, those of the Japanese, the Chinese, and other nations, furnish us with most ample practical experience that we should fully utilize. The various types, whether the "Armstrong" (Chinese), "Rendel," "Inconstant," "Iris," "Comus," "Mallard," "Albatross," "British Empire" ("Hecla"), or "Snake," each have features to recommend them, and special uses. But we must maintain ample carrying power for bread stuffs, and other food supplies, also for raw material to keep our factories going. No more risk of dear food, or of cotton famines, can be endured. We must not think of permitting our supremacy to slip from us, nor should we drift into a state of false security, from which we may have a rude awakening. We may have to make sacrifices, but we must not risk such disaster as befell the United States within our own time, irretrievable as it has been. Our Mercantile Marine, instead of being a source of weakness, can be made a source of infinite strength, by preparation, and by due precaution, nor is much money needed; as Captain Harris so clearly stated, in the opening of his paper, the value of our mercantile supremacy, and pointed out how transient history has shown such to be, let us arouse ourselves "every man jack of us," at home and abroad, so that history may not be repeated, and we may still maintain the British flag as sovereign of the seas.

Captain NOEL, R.N.: Captain Harris has completely cut the ground from under our feet, for he has provided an answer to well nigh every consideration, and I must say, in all his points except one or two, I most fully concur. The paper is a most admirable and valuable one, and we have all to thank him for bringing the matter so thoroughly before us. It was also very well timed, because Mr. Barnaby, in his paper on Battle-ships, sought an answer of this kind, and I think, on all points, Captain Harris has given very fair and proper answers. With reference to heavy guns, I do not quite agree with the lecturer. Heavy guns are intended for use against armour; but recently armour, or at any rate broadside armour, is being done away with, and therefore I do not see that heavy guns are so important now as they were when we had to oppose armoured vessels. Captain Harris says light guns and slow ships will soon be obsolete, and fast ships and heavy guns have a much longer life and usefulness; of course, slow ships become obsolete because the world is going quicker than it has ever done before. We must all go quicker, so naturally we want increased speed in our ships; but I dispute entirely that light guns are obsolete. If we take the lightest guns of all—the machine guns—they are not obsolete. They represent the gun of the future, unless there is armour or some substance to oppose their fire; then, again, the heaviest guns of all require a perfectly firm and steady platform, and that is what we have not got. The heaviest guns are suitable only for forts. What we want at sea is not to pin our faith to one gun, which must be on a perfectly steady platform, but to have several guns, and the less armour there is to protect the guns, the more necessary is it that we should have a number of them. If we have only one unprotected gun to fight, it may be knocked over or disabled, and then there is an end of your gunnery. I have always advocated—and I see no reason for altering my opinion—that we should have a moderate number of moderate-sized guns. The most important part of this paper is that with reference to the Mercantile Marine, and I quite agree with Captain Harris that it will be a very great source of weakness to us in warfare. It is very necessary that the carrying trade should remain in English bottoms, and it is very questionable whether, unless we can afford a sufficient protection for our

Mercantile Marine—that is, unless we can prevent the enemy from using force against it to any great extent—our carrying trade will not, in all probability, go out of our hands. As regards the assistance that the Mercantile Marine can give us in warlike measures, there are very many things against their ships being so employed. As one gentleman tells us, we cannot take their men from them, and another, we cannot take from them the trading duties they have to perform; the country requires food, and therefore we cannot employ the vessels required to bring the food, for warlike purposes. Again, what can a merchant vessel do? If she is armed she must be under our flag, in order to use those arms (I do not think that a merchant vessel armed, unless she is under the Government, can use any force—she would be treated as a privateer if she did—she must be under the flag). All the use that that vessel can be put to is to convoy other vessels of her own class, and to oppose armed merchant vessels of foreign nations. As to a merchant vessel ever being able to hold her own with a man-of-war it is out of the question, so that the only employment for these magnificent vessels in war time is to protect other vessels, that our men-of-war are not fast enough to convoy. The commencement of Captain Harris's paper I more fully agreed with than with the two concluding sentences, which, I think, are rather in opposition to the first part. He expresses in them very great confidence. Everything in this paper tends to show that we require a greater naval force; our force is not so satisfactory as I am certain most naval Officers think it should be. We want vessels, and we want more money. We have a great deal to thank Captain Harris for, in the opinions he has expressed and the information he has given us in this very able paper.

General Sir LINTORN SIMMONS: It seems presumptuous on my part, as a soldier, to raise my voice in this assembly on a naval question, but after the observations which fell from the gallant Admiral just now, in which he drew your attention, Sir, as a Lord of the Admiralty, to the importance of docks, I should like, as an engineer Officer, having been lately employed in the consideration of questions connected with the defence of British possessions and commerce abroad, to draw attention to another very important point, namely, the protection of docks and coaling stations. These will be of no use whatever in war if they have to depend for their protection upon ships and floating batteries, which will find their sphere of action on the high seas; unless, therefore, docks are protected by works of defence, they cannot be relied upon by our ships, which, as the gallant Admiral justly pointed out, must depend in very great measure upon them for their speed. There is another point to which the gallant Officer has alluded, and that is the question of convoys. I have heard this question discussed, and it seems exceedingly doubtful to my mind whether the days of convoys are not past. The steamers in which British commerce is conveyed are, a vast number of them, of very low speed. How, then, are convoys of such ships to be protected in their course from any given port in which they may be collected to their port of destination? It is the speed of the slowest ship in any convoy which must regulate the speed of the whole. If these vessels have only 8 or 9 knots—and a very large number of our Mercantile Marine have only that speed—it will become an exceedingly difficult matter, if not almost impossible, to convoy with safety a fleet of such ships where they are exposed to attack by ships of high speed, that might act against them from any quarter. It is no longer a question of seamanship, and of keeping to windward; but the power of moving by steam in any direction at high speed permits of an attack being made on a convoy from any point of the compass. The question of convoy is, I think, very serious, and it is one which I should like very much to hear debated in an assembly of naval Officers. Then, again, there is another point. The larger and swifter merchant ships are of great use in our carrying trade, and no doubt, in the event of war, a very large proportion of our trade will depend upon the safety with which these ships might make their voyages. In order that they may make their voyages with safety there are two requisites absolutely necessary—a safe port from which they may depart, and a secure port to which they can run. Therefore, unless secure ports are provided at certain important centres of trade with which our commerce is connected, the passage of these ships might become uncertain; so that not only for the purpose of protecting docks and coal depôts, but also in the interests of commerce, it is absolutely necessary that there should be good and secure ports in our Colonies in which

mercantile ships may at all times find refuge. There is another point which struck me as of considerable importance, which has been referred to by the writer—whose paper is an exceedingly interesting one, full of very valuable information, and containing a great many suggestions, calculated to cause reflection, and to elicit very useful results. The writer says: "It seems more than probable that if, in the immediate future, any fleet battles have to be fought, they will be contested on the old historical naval battle-fields—either in our Channel, the Mediterranean, or in the waters of the West Coast of Europe." I believe that will be the case, but I also believe that we shall incur very serious danger on the outbreak of war similar to that with which we were threatened when there was a probability of war some four or five years ago with Russia. On that occasion a small Russian squadron was collected in a port of the United States, in the full anticipation that war would be declared. Now, I think that, in ticklish times, when there is a probability of war, it will be quite within the competence of a naval Power to follow the example of Russia, and to assemble a squadron—perhaps not a very large one, but a squadron, or even squadrons—in different distant ports, which on the outbreak of war would be most embarrassing to our possessions abroad, and to our commerce. The difficulty would be to know where the enemy was, in what part of the world his ships might be lying, and against what particular point or points of our widespread dominions he may direct his attacks. By the aid of steam he may direct his attack against any port or line of ocean trade he might select, and it would be almost impossible to foresee and provide against such attacks. Under such circumstances it is conceivable that small squadrons may, possibly, at the outbreak of war, visit any of our Colonial ports, including some of those valuable stations which the Admiralty consider so necessary for coaling and re-fitting, and as docking stations for cleaning ships' bottoms. This possible and not improbable course of action requires careful consideration, and considering the scattered nature of our possessions, and the vast extent of our commerce, as shown by the diagrams on the wall, entails upon us the necessity of having a much more numerous and powerful fleet than that of any other nation. If time permits, I should like to make one or two observations on the subject of the use to which fast merchant ships can be applied in war. I had not the advantage of hearing Mr. Barnaby's paper, but having giving much consideration to the subject, I venture to think it is a mistake to send out guns for these ships to distant ports with the idea that, on the outbreak of war, they may receive their armament in those ports. If these ships are to be effective on the outbreak of a war, they must be armed in some other way. They can never, of course, be expected to meet and fight the fighting ships of other nations, but they should be fully equal to contend with similar ships fitted out by other nations. Being very fast, they will form a very important element in naval warfare; if they can remain on the routes by which they ordinarily traverse the ocean they will be continually bringing to our naval authorities information of what is going on along those routes, and of the movements of the enemy, which will be of especial value at the commencement of a war; we shall also have to depend upon them for the conveyance of mails to and from the Colonies, India, China, &c., and of some of the most valuable articles of commerce. For instance, the gold trade from Australia, and the food, without which we should be starved into submission in a few months, will have to be carried in these ships; I think, therefore, it would be of the greatest possible advantage if during peace we could organize a system by which these ships might have on board, at all times, the means, in the event of war, of protecting themselves. If, when war breaks out, a ship of that class were at a distant station, Hong Kong for instance, the guns may be there, but if the crew are not trained and the ship not fitted, the Admiral at the station would probably not be able to spare gunners and trained seamen; and the probability is that the ship would be very little better than useless for a considerable time, unless some of its crew had been previously trained to the service of guns. I believe a great step might be taken towards making these fast ships immediately of use on the outbreak of war by adopting somewhat of our Volunteer system; if the owners were encouraged, they might be induced to allow a gun or two of light calibre to be placed, one at the bow perhaps, and the other in the stern, and to have their crews trained to serve them. For this purpose they would require one or two

trained gunners from the navy on board each ship, in the same way as the army give trained instructors to the Volunteer Corps. If the Admiralty supplied trained instructors, men belonging to their crews could be taught to work the guns; not many men would be required, and I venture to think that the knowledge by the public that ships were certified by the Admiralty, and had guns on board, would be an inducement to people to give them a preference as passenger ships and for trade purposes. Inspection, from time to time, would insure that the guns and stores were kept in proper condition, and that the men were properly trained. I venture to throw out these suggestions, having had the subject a good deal under consideration of late, and shall be glad if they may be found useful.

Captain T. BRAND, R.N.: I gather from the last speaker that he, to a certain extent, challenged naval Officers to explain what they want done during war in the way of convoying our merchant navy. I am only throwing out a suggestion, which I hope will give rise to a discussion on the subject, but I think that now the trade, whether it be to the Mediterranean or to America, is always done by steam, and, therefore, that the ships go on a certain line which is known. And I would, like Captain Noel, ask for something—that is to say, that our navy would require a great many fast cruizers, which should be at certain distances apart on those lines, communicating one to another, from time to time, if possible, and protecting the line on which ships travel, and therefore obviating the necessity for a convoy; because, although a ship would, of course, have to take her chance, the enemy's ships would, at the same time, know that, on that line, they were liable to be attacked. With regard to fast steamers, I think those very fast steamers cannot be exactly termed men-of-war, and though they must carry the flag to defend themselves, I should look to them more to combine two things. We are told that they are necessary for our trade, to provide us with food. If they are armed they have more chance of bringing food to the country than if not, and I would say that those fast ships would be a match for, at all events, several of the ships that were commissioned by Russia at the time that war appeared imminent between Russia and England, and I think not only that they might be armed very nearly as well, but also they would probably be faster. Under those circumstances the ships would be used as merchant steamers, carrying the flag and carrying guns, but they would not fight if they could avoid it. I simply throw these out as suggestions.

Captain T. S. JACKSON, R.N.: I, in common with others, have very little to find fault with in Captain Harris's paper. I am rather interested in the distinction which he draws between ironclad ships of a greater speed than 12 knots and those of less speed. I hardly think we should have much difficulty in our Service in dividing those that have a sea-going speed of over 12 knots and those under. Then we come to the question of ocean cruizers. The great difficulty, of course, in getting satisfactory ocean cruizers—men-of-war I mean—so that they may be capable of carrying on an action with men-of-war of other nations, is the enormous size they run to, and the consequent expense. I fancy—I am speaking, of course, very roughly—that it would be hardly possible to produce a satisfactory ocean cruizer, carrying coal supply sufficient to take her over the world, and with good speed, under 9,000 tons displacement. In our fast armed merchant steamers we, of course, sacrifice protection from torpedoes to a very great extent; they are much more liable to injury than the regularly built man-of-war; but we get the speed; we get the coal supply, and we get a certain fair armament; and perhaps the great increase in the value of guns will make these ships very formidable indeed, and capable, not only of protecting themselves, but of protecting others against small men-of-war, and vessels of the same description belonging to an enemy. In the last paragraph, referring to gunboats and dispatch vessels, Captain Harris says, "The function of the gunboat proper, in the ordinary sense of the term, is, during times of peace, to economically represent the national flag in foreign parts, up rivers, and shallow harbours." Now I object strongly to the expression "economically." I believe they are the cause of great expense to this country, and the money swallowed up in a number of little ships, especially on some foreign stations, that can neither fight nor run away, incapable of carrying coal, with poor armaments and no speed—in fact, having no good quality about them but their light draught of water, would give us a few efficient cruizers which, acting in squadrons, would have

a much greater weight. Captain Noel is strongly in favour of light guns, and says that armour is done away with, and, therefore, we do not want heavy guns because light guns are quite sufficient in the absence of vertical armour; but if we give up carrying the heaviest possible guns, of course the vertical armour at once assumes its former value, and then you have to go back again to the heavy guns.

Admiral SELWYN: I desire to commence my remarks by insisting on the view that has always been taken in this Institution that England cannot give up the supremacy of the sea. Whether it is to be retained at a great cost or a little cost, the supremacy of the sea is absolutely necessary to this country, and must be preserved. The next question is how this can be done in the most economical manner. It is, as in most other matters of business, a question of steadily keeping pace with the necessities of the age. We must cease to regret the time when our income and expenditure were not as great as now; we must increase our navy so as to preserve, at all times, the same proportion to our national income as formerly, or you will never get on a right basis of calculation, what expenditure is reasonable for such a purpose; and no House of Commons will ever grudge the expenditure if it is shown to be an absolute necessity of our existence. It is lamentably true that even with the very best proportion we can make there is the unavoidable concomitant of war, called war insurance; and if we were attacked with the facility which steam has given to all nations, there is very little doubt the rate of war insurance would go up considerably above that of other nations who were neutrals, and we should find ourselves handicapped by that burden. We could never afford to entertain the idea of bringing down the speed of a convoy to that of the lowest speed in the convoyed fleet, for if that were done it would at once cut out the whole of the profits of our carrying trade, and the facilities of our passenger and mail traffic, and hand them over to some other nation. It is quite clear that such a carrying trade would involve a loss, in face of the active competition to which it would be subjected. With regard to docks, of which Admiral Jones spoke so strongly, I recognize their value as much as he does. I have long done so, and at the Naval Architects some years ago there was a very pregnant discussion on the subject. They all agreed that to build docks whose length was a constant quantity in any of the Colonies, or in any place, with the view of docking our naval ships, would be a gross error, and for this reason, that we are constantly changing the dimensions of those ships, and that the dock might, in the event of war, be found to require enlargement, which there would be no time to give them. Therefore, I am fully of opinion that the proper provision to be made is the best type of floating dock, whatever that may be; it will answer better, and do more active work at all times, besides being capable of removal from a port, if, unfortunately, that port fell into the enemy's hands. Now I want to give a little consolation to Captain Harris. He has had a great deal of matter that was not in his paper to listen to, under the name of discussion of that paper, and he has not had much help towards the solution of the questions which he proposed to himself and to us. I am happy to say that I know, at this moment, a vessel of 800 I.H.P., which will be launched within the next fortnight, which, first of all, instead of consuming 2·2 lbs. of coal per indicated horse-power, will find 1 lb. of coal amply sufficient; secondly, that the weight of the engines and boilers which do that is far under 100 lbs. per indicated horse-power, instead of being over 300 lbs., which is the best type we have at present; thirdly, that those boilers, once put on board a ship, can be repaired to any extent by the ship herself, and, as far as I know, with fifteen years' experience, they are entirely indestructible,—they do not show any signs of wear after fifteen years' work; and I believe that they will be rapidly brought to the front. I need scarcely point out that that involves the whole question of coaling, the whole question of the time you can remain at sea, the whole question of repairing your engines and boilers abroad, and, in fact, the whole question of the speed and the efficiency of our war-ships. That, I think, must be recognized as an enormous step in progress, and I only regret there is not quite so much disposition as I should wish on the part of those whose business it is to investigate and ascertain that progress, for the condition on which we can retain that supremacy to which I have referred, and which is absolutely indispensable to our national existence, is that we should always be in the van of progress. We cannot hope that others will not imitate it, but we must

not only be able to say that nobody else, in naval affairs, has got anything better than we have, but we must always be able to boast that we have got something better than anybody else. From America I have received information with regard to the subject of using liquid fuel. They are now running a locomotive in America with comparatively little fuel of any sort or kind, and for that comparatively little they are bold enough to use naphtha. The result is this, that, chemically speaking, hydrogen is by far the most valuable constituent of fuel. Many persons have tried to burn so-called water-gas, but they have failed to do it, because the proper conditions were absent; but the Americans, by joining the use of liquid hydro-carbon to the hydrogen, or water-gas, have been able to drive a locomotive, so as to do quite double the duty that any locomotive of its character ever did before—that is to say, it will take a number of cars up an incline which no engine of less than double the weight could have done under any other circumstances. With the boilers and engines for marine purposes I just now referred to, if fired with liquid fuel, there is no destruction of the tubes or flues, no smoke, no dust, none of that noisy rush of steam, due to escape or exhaust, since there is no exhaust or steam escape required, and there is no waste of steam in the engine, because the steam passes back to the condenser, either from the engine or the safety-valve. I can guarantee that I have seen 27 lbs. of water evaporated with every pound of fuel. The fuel was blown in with the steam, but that fuel is not of a character which need give any concern to anybody, seeing that you cannot burn it unless you blow it in with steam. It will burn if it is heated up purposely, and then a wick is used, but not under any other condition. It will give you at least three times the value of the 1 lb. of coal to which I adverted, in respect of producing so much indicated horse-power per hour. First, we reduce consumption to 1 lb. of coal per indicated horse-power; this doubles the quantity formerly carried, and brings us to eight days instead of four. Next we evaporate with liquid fuel 27 lbs. water, instead of seven or eight, and this is far within the truth. Now we have got to thirty days' full steaming by putting in these engines and boilers, of which I spoke, and by having recourse to that fuel. We can take any one of the ships that is below 12 knots if she be not more than 2 knots below, and bring her up to 14. That is, of course, by changing the engines and boilers, by carefully observing the progress of economy in fuel, and by going on, as I desire to see the country go on, with every advance of scientific knowledge. With regard to the employment of the Mercantile Marine as war-ships, we all recollect the time when the East India Company armed their ships. They very wisely and properly did not forget that the chief *raison d'être* of a Mercantile Marine is to carry the commerce of the country; they avoided battle whenever they could; they behaved most gallantly when they were forced into it; and in that way an armed Mercantile Marine may be still extremely valuable. The altered conditions have favoured our commercial marine by giving them greater speed and more manœuvring power, with independence of winds and currents; and they can, to a certain extent, by speed and torpedoes, defend themselves against the most formidable vessels. But those formidable vessels, in other countries, do not exist in such large numbers as in our own, and we ought to be able to keep a certain number of such formidable vessels communicating with each other along the lines of traffic, which are now much more closely defined than formerly. But that, again, is a condition of things that can only be secured by carrying many days' fuel for high speed, and in order to do that the very first condition to be observed is to economize your fuel to the lowest point possible, to make sure of efficient boilers and engines, at all times for long periods, and that you can always get a full supply of the fuel you require. With these few remarks I will congratulate the naval members of this Institution on having listened to such a very effective paper on such an important subject.

Major-General DUNNE: Having been in Egypt during this last winter, I used continually to hear great disappointment expressed among the people visiting there at the want of accuracy of the naval guns, with regard to the bombardment of the forts of Alexandria, as exemplified in the very small number of guns that were knocked over by our fleet; and if, as Captain Noel says, it is impossible to secure more accuracy in naval guns at sea, it does seem very much better to have a larger number of guns than to have to rely on one or two; whereas on shore at the new

battery at Delamira Bay, Malta, where I saw practising three weeks ago, after a third shot at 2,500 yards, a flagstaff was knocked over by a 35-ton gun. If naval guns cannot be depended upon in that way, it seems, when convoying, the greater the number of guns, the more likely you are to keep your enemy at a distance, and when you have to rely only upon one or two guns, you may very often have to let him come to very close quarters.

Lieutenant SLEEMAN, late R.N.: I have heard a good deal said in this Institution with reference to convoy-defence for our Mercantile Marine, but I have never heard it suggested that the question resolves itself into whom is it necessary to defend our Mercantile Marine against? For instance, in the late Egyptian campaign our Mercantile Marine required no protection, for our enemy had no navy. Then if it should be our misfortune to be at war with Russia the whole of our navy would easily hold in check the whole of the Russian navy, and our Mercantile Marine would in that case traverse the ocean as comfortably as they do at present; and if we were at war with Italy the same thing would happen. If, on the other hand, we were at war say with the whole world, then we should have to defend our Mercantile Marine in every part of the world at the same moment that we were also bombarding the ports and holding the other navies of the world in check; and that is why, in order to ensure protection to our commerce, our navy should compare numerically with the navies of other Powers. In regard to the question of big ships and little ships, I often hear it stated that a big ship would be very quickly put *hors de combat* by a number of small ships; but the question of the state of the sea is always left out. I think it would be extremely difficult in ordinary weather for small torpedo vessels or gun vessels to get near a big ship, whose platform would be perfectly steady and which possessed great speed and manœuvring power. Under these conditions that question of the sea seems to me to be entirely left out. The three features of a perfect sea-going man-of-war are steadiness of platform, great speed, and great manœuvring powers; and I think it is almost impossible to combine the three in any ordinary sized ironclad. It has never yet been done. My experience has been that a very slight swell upsets the accuracy of the guns of most ships very soon. The lecturer mentioned a torpedo vessel towed astern of the vessel. Now I am a great believer in torpedoes, and I believe in future naval wars the torpedo will play an infinitely more important part than is accredited to it at present; but I doubt very much if a torpedo with 50 or 100 lbs. of dynamite towing astern of a ship would be at all a pleasant neighbour; it would be more likely to damage your own ship in an ocean fleet-action than do any harm to the enemy.

Captain HARRIS: I was speaking of a single action only.

Lieutenant SLEEMAN: In a single action it might be used; but then if you were brought suddenly to a stop, the torpedo would come rushing up under your stern, which might be rather awkward. I must thank Captain Harris for his very valuable paper.

General SCHOMBERG, R.M.A.: I should like to say a few words on this subject, from an artilleryman's point of view. I quite endorse the paragraph of Captain Harris's which has been attacked, in which he says that "Fast ships and heavy guns have a much longer life of usefulness." I am of his opinion, that it is much better to trust to armament than to armour. I will also repeat that our chief defence must lie in our power of offence. At the very commencement of a naval war we must attack our enemy's strongholds on the sea-board. The best way of attacking such places would be by vertical fire, now called "high angle" fire, from mortar boats, which seems now to be entirely overlooked and neglected.

General Sir LINTORN SIMMONS: There is one remark I should like to make with respect to the question of convoys. I perfectly understand that a given route can be protected by ships along its line: that is not what is commonly understood by convoy; but I doubt very much whether that same system would be applicable to all our great trade routes. A trade route such as that from Liverpool to New York may be so protected, but the protection of long trade routes, such as that to Australia, round the Cape to India, is quite another thing. I should like to hear the question of protection fairly settled with reference to what is ordinarily understood as a convoy.

Captain HARRIS: I am sure I am very much obliged to everybody here present for the kind attention they have given to my paper. And I am also extremely well satisfied that it has elicited so many valuable remarks from different people. I thought that Mr. Barnaby's paper was not replied to as fully and freely as it might have been on the occasion of its delivery, and I venture to think that we have now given a fuller and more complete answer to his questions. I have not time to reply to all the remarks that have been made, but there are one or two observations which I do not like to leave unanswered. Admiral Ommanney remarks that I limit a fleet to 12 knots' speed. I did so because at present it is impossible to get more; I entirely agree with him that if we could get 14 knots it would be far better. Captain Noel, in referring to the fifth question of Mr. Barnaby about guns, says that he differs from me there. I may say, that although he says he differs, yet that I agree with him; for while I firmly advocate the introduction of large guns, still I quite admit the value of small guns used in conjunction with the large guns, and also machine guns; but when he rather pitches into me about my having a little too much confidence in my last two remarks, then I do not think he has read them as carefully as he might have done, or he would have seen that I mention—perhaps it may be qualification on my part—"that if we are true to ourselves"—if we are true to ourselves we certainly shall never allow our fleets to go to the bad; we, as the leading maritime Power, ought to be always strong enough to meet a combination of any two or three other Powers; and in that case I do not think it can be said that I am over-confident in my concluding remarks. No doubt, as Sir Lintorn Simmons remarks, the whole question of convoy is most important, and demands our serious attention; it would be well worthy of a separate paper, and I cannot attempt to reply to it now. I should, however, hope in the event of war that we should be able, in a very short time, to assume such complete control of the seas that convoys would be needless. If we could once blockade an enemy's ports, we ought never to allow a vessel to escape from them, or at any rate be long at large from them, and in such a case our carrying trade would soon return to its normal condition. I may again say that I am much obliged to you for the attention you have given me, and repeat that I am well pleased to have been the means of affording a more complete answer to and discussion of Mr. Barnaby's important paper, than was obtained on the occasion of its being read.

The CHAIRMAN: In the position of responsibility in which I am placed with reference to naval affairs, a position which I am quite unworthy to fill, I should doubtless exercise a wise discretion if I were to confine myself to offering my compliments to Captain Harris for the able paper which he has read to us. But I feel so deeply interested in the paper that I should like to offer a few remarks. In the opening passages of his paper, Captain Harris refers to the communications with our Colonies. We are not insensible of the gravity of the questions. At the same time we may note with satisfaction that there is an increasing capability on the part of the Colonies to provide for their own defence, and to co-operate with the mother country in carrying out the Imperial policy of the British Empire. With reference to the Mercantile Marine, we cannot conceal from ourselves that it is at once a source of strength and a source of weakness. With existing estimates, or with any increment of expense which we can reasonably entertain, it is impossible to provide or to create a pure fighting navy, proportionate to the difference in the tonnage which is afloat under the British flag, and which is afloat under the flags of other Powers. On the other hand, this great Mercantile Marine implies that we possess all those essential and vital elements of naval greatness to which Captain Harris very properly referred, implies the power of extension and of creation in a degree to which no other maritime Power can possibly pretend to have attained. The lecturer has referred to two points which involve great difficulty in regard to the naval administration of this country; he has referred to the financial difficulty. It is very difficult to be precise in defining what is the amount of expenditure which would be sufficient to maintain an adequate navy for this country. All that we can say at the present time is this, that we have made a considerable increase in very recent years in the expenditure upon the material of the fleet. The increase of expenditure in the last three years has been not less than 400,000*l.* in the ship-building votes. What the future requirements of the country may demand is, of

course, a question of policy, on which it would be most unwise and imprudent on my part to express an opinion on this occasion. I can only say that we are watching with vigilance the proceedings elsewhere. The lecturer very properly referred to the difficulty of determining the application of the expenditure, whatever this amount may be, which may be placed by Parliament at the disposal of the naval administration. The lecturer, to whom it was said that little consolation had been offered in the various speeches, will derive a substantial consolation, if he needs it, from his observation of the policy which has been lately pursued in the construction of the fleet. The general lines which he indicated have been tolerably closely followed in the recent application of the ship-building votes. The lecturer insisted, in the first place, upon armourclads as the prime necessity for the navy, and he spoke of a speed of 12 knots as being an essential condition; but he was silent in reference to the thickness of armour, and the weight of armament upon which he would insist. I can only say that these points on which he was silent are very important and essential points. If we were content to build the smallest vessels which would satisfy certain conditions with reference to armour and to armament, it is obvious that we might increase our numbers much more rapidly than we are now increasing them. I have always been an advocate of reasonable limitations in regard to the dimensions of our ironclads; but we cannot conceal from ourselves this fact, that for every addition which is made to the tonnage, the naval architects can make some valuable addition to the fighting efficiency of our ships. They can increase the armour, they can give greater speed, they can give greater coal endurance. On the other hand, as you increase the tonnage, so you tend to diminish that facility of movement which is of supreme importance in the use of the ram, and you also involve yourselves, probably, in difficulties with regard to the draught of water. Having these considerations in our view, it may be claimed for the recent policy of construction that we have avoided extreme dimensions. We have endeavoured to meet the point raised by Captain Noel, with reference to light guns, by giving to the new type of ships, the so-called "Admiral" type, a mixed armament which includes, in addition to the heavy guns, what I hope will be a very valuable battery of light guns. With reference to speed, the lecturer asks for 12 knots as a minimum. I am glad to know that we have gone far beyond the minimum laid down by the lecturer in the recent development of our armour construction. We hope to obtain in the vessels of the "Admiral" type at least a speed of 16 knots, which represents a very great advance upon what has hitherto been obtained. That advance is due partly to improvements in the means of creating forced draughts, but also to a sensible improvement in the models of our ships. We have given them greater length, and a form which admits of the more ready attainment of the important quality of superiority in speed. The lecturer next insisted upon the essential value of fast corvettes, and he very properly said that suitable vessels for the purpose of defending the commerce of the country could not be improvised; and that, therefore, the construction of those vessels should not be delayed in time of peace. Without expressing an opinion as to whether or no what we are doing now is adequate, I am glad to say that we are doing something to meet the views of the lecturer. It has been the recent policy to replace in the building programme those large corvettes not exceeding 14 knots by a class of vessels of the "Leander" type, which will have a speed of 16 knots, and by a still more recent design, known as the "Mersey" and "Severn" type, which will have a minimum speed of not less than 17 knots. Captain Brand referred to the importance of these fast corvettes with reference to the altered character of our communications by sea with the various foreign emporiums of trade, and he pointed out, and I entirely agree with him, that the task of the navy is made more easy by the transition from sail to steam. He insisted upon this fact, that along the great lines of trade the vessels following very much the same course can be more easily protected than in former days when they were propelled by sail, and necessarily were much more widely scattered over the seas. My gallant friend, Sir Lintorn Simmons, I think, has expressed some doubt as to the ability to provide for the protection of commerce by undertaking to patrol any given route which that commerce might follow, and no doubt the General's objections are perfectly valid with reference to many important portions of our trade. But so far as I may venture to speak as an amateur sailor, my experience

goes far to confirm what fell from Captain Brand. Nothing impressed me so much, when crossing the Indian Ocean some three years ago, as the extraordinary regularity with which we seemed to meet steamers going in the contrary direction to ourselves from Point de Galle to Penang; we met them on the starboard side, we met them on the port side, we were constantly meeting steamers, showing with what extraordinary precision under steam the navigation is conducted along the shortest route from one point to another. If that be so, of course it is much more easy to protect by means of patrol than it would be when the commerce was more scattered. The lecturer referred to merchant vessels as having a valuable function in relation to naval defence. The measure of that value must depend upon the kind of attack which you anticipate in the event of war. If the attack is to be an attack upon your commerce, and made in vessels similar to your own merchant vessels, then much may be done by judicious organization to give to the Mercantile Marine the power of self-defence. As far as we may derive some conclusions from what is taking place abroad, it is important to notice the high appreciation which is expressed by foreign administrators of the fast merchant steamer. We find that appreciation expressed in a practical form of great and increasing subsidies to postal steamers, the construction of which is encouraged, with reference to their double use, both for the purposes of postal communication in time of peace, and also for conversion into auxiliary cruizers in time of war. I would not give the merchant steamer a higher value than this, that it is capable of meeting a similar vessel under a foreign flag. Then the lecturer referred to gunboats, and he said he did not ascribe any very important value to gunboats for the purposes of war. I entirely concur in that view. We must always be prepared to create rapidly gunboats for special operations; but I hold that it would be wise in time of peace to be content with building and maintaining a sufficient number of gunboats for the purpose of the police of the seas. The lecturer said the gunboats were not very valuable for the police of the seas, and that they were very expensive for that purpose. There is much truth in this, and I venture to think that we shall find the type of sloop a more valuable vessel for the police of the seas than the smaller class of gunboats. I quite concur in what fell from the lecturer as to the policy of building fast vessels, developments of the idea initiated by Sir William Armstrong. No doubt the type that Sir William Armstrong has produced is not perfectly satisfactory from a naval point of view. Those vessels are fast and powerfully armed, but they are greatly deficient in accommodation, very miserable to live in, but it is a type to which attention should be directed. With regard to the torpedo vessels, I apprehend it is the general opinion of naval authorities that they may become at some future time most formidable assailants for our ironclads. I say, therefore, that these fast light vessels, whether gun vessels or torpedo vessels, are vessels which we should be building, in a certain reasonable proportion, in time of peace; but, on the other hand, I fully concur in what fell from Lieutenant Sleeman, that such vessels can never be regarded as substitutes for the larger vessels. You must have the larger vessels as well as the smaller vessels. The large vessels are, as it were, the naval basis from which the smaller vessels may act, and they are absolutely indispensable for the important purpose of holding and keeping the seas, and carrying large bodies of seamen to the various points at which the navy may be called upon to act. We have had the value of large vessels, and their power of carrying large crews, signally illustrated lately. No small vessels, however swift or handy, or powerfully armed, would have been able to render the service in support of the army which was lately rendered by the fleet in the Mediterranean. Sir Lintorn Simmons and other gentlemen have referred to the subject of docks. I can assure those gentlemen that our necessities with regard to docks have not escaped my attention, and I do not consider that the necessity for docks is at all affected by any doubt or uncertainty that we may feel with regard to the future dimensions of our ironclads. Of late there has been no tendency to increase the length of our ironclads. At the same time, looking to these matters with reference to the conditions under which public affairs must be administered, I may point out that we are making steady progress with regard to docks. What we are doing at the present time is this: we have undertaken to double the dock accommodation at Malta, which will be a great benefit to the navy. A dock is being completed by a private company, assisted by

the Admiralty, which will be of great service at an important strategical point, namely, the Cape of Good Hope. We are in negotiation for another dock at Hong Kong, capable of receiving any ironclads sent to that station, and we are following up a negotiation with the Indian Government, with reference to the dock accommodation at Bombay. I hope that, whether under the present Government or the Government which may follow it, these good intentions may be carried into effect. While acknowledging that we have necessities which have not yet been met, it is of course obvious that we are not worse off, but rather better off, than any Power with which we might be engaged in conflict. I only desire to say, in conclusion, that such papers as that which has been read to us by Captain Harris, and such discussions as that which has followed the reading of the paper, are of immense value. They suggest ideas, they promote thought on these subjects. I am very glad to have been present on this occasion, and I can assure Captain Harris that his paper will be appreciated.

Admiral LUARD: While we all unanimously thank the lecturer for his paper, I think we cannot do less than agree, with equal unanimity, to thank Sir Thomas Brassey for having come here to-day at great inconvenience to himself, and also for having given us the very interesting observations to which we have just listened.

Friday, May 4, 1883.

GENERAL THE RIGHT HONOURABLE LORD WOLSELEY, G.C.B., G.C.M.G., &c., Adjutant-General, in the Chair.

THE LATEST DEVELOPMENT OF THE TACTICS OF THE THREE ARMS.

By Colonel C. B. BRACKENBURY, R.A.

BEFORE entering upon the consideration of the late tactical developments, it seems necessary to clear the way by defining the meaning of the word tactics, which is sometimes confounded with strategy on the one hand, and with drill on the other. The whole art of war, whether conducted on the greatest or the smallest scale, is governed by one great principle—namely, to bring a superior force of one's own in contact with an inferior force of the enemy. The superiority may consist in either of two things. Physical superiority as in number, armament, &c., and moral superiority which may be gained in many ways. Military organization and strategy have to deal with the preparation of armies, and the great movements on the theatre of war which bring them into the neighbourhood of the armies of an enemy. At this point the art of tactics asserts itself, and may be defined as the movements of the parts of an army when in close proximity to the enemy. Drill is one of the details of tactics, and enables tactical combinations to be carried out. But drill may be said to be mechanical, while the tendency of tactics is to become less and less mechanical, and to give more and more value to moral considerations. We have nothing to do this afternoon with strategical combinations, only with pure tactics.

There has been of late years a good deal of controversy on tactical subjects. The present system of fighting, adopted with much reluctance by this country, appears at first sight a concession to irregularity; if this were true no theoretical arguments should be permitted to weigh against the great elements of military success, discipline and order. But in truth the modern system is but an effort more or less satisfactory to reintroduce order under conditions of weapons which tend to produce disorder, and I shall attempt to show that the tactics of the day are the natural development of an art which has been progressing gradually in a definite direction during the whole period of European history. A few words on the past may serve to show what this direction has been.

In the Punic wars, when men fought hand to hand in heavy masses, and when cavalry could approach unharmed within 15 yards of infantry, Hannibal obtained his great successes by ambushes, and by

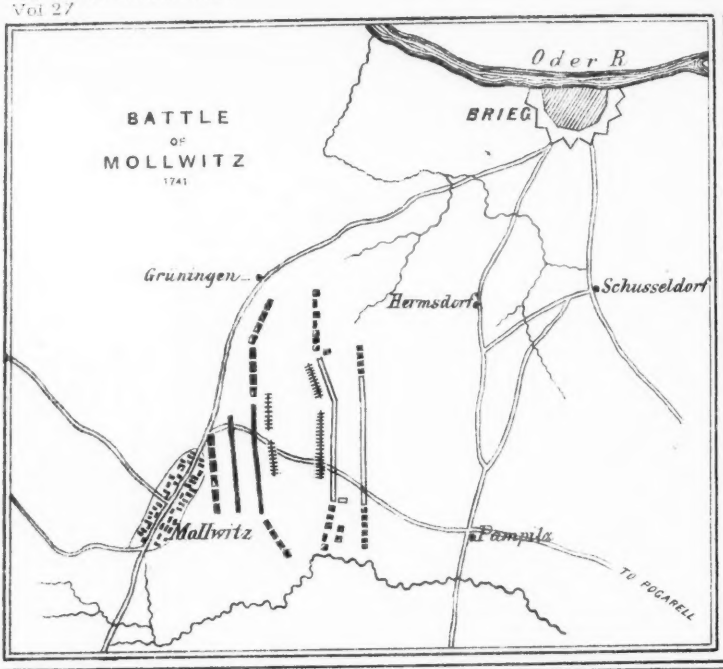
acting on the Roman flank in oblique order, or on both flanks at once. Here were the physical superiority of the flank attack, that is, many men acting against few at a particular point, and the moral effect of surprise.

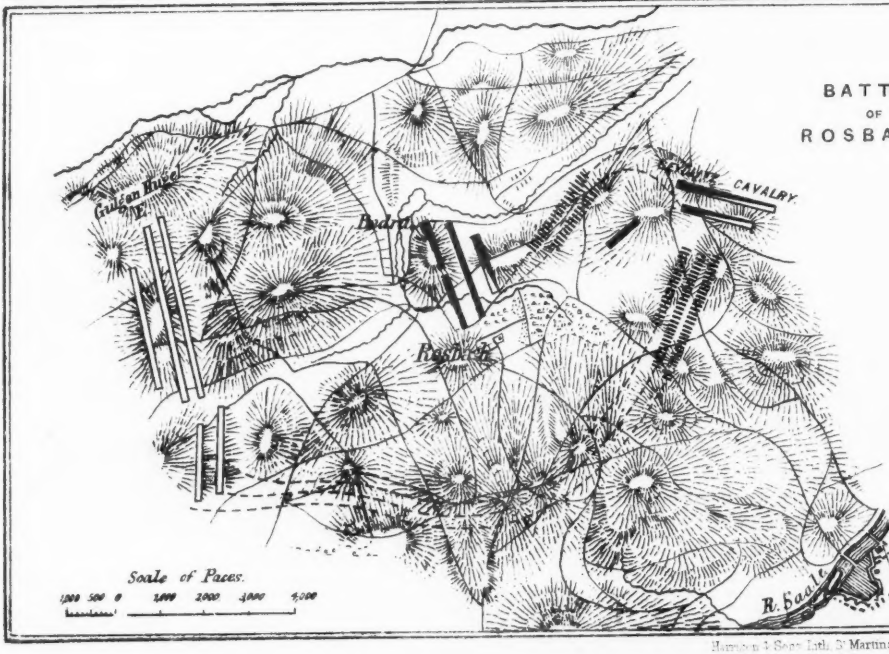
If we leap over many years and look at Marlborough's campaigns, when armies fought in two lines, each two or three deep, with muskets which carried 200 yards and slowly moving cannons, the effective range of which was perhaps 1,000 yards, we see that armies would commence their struggle at a greater distance apart. Drill had not then made armies flexible, manœuvres were difficult, and the usual course was for one army to take up a position and be attacked by another advancing parallel to it. Marlborough, with the eye of a born General, read the phases of a fight, detected the weak points of an enemy, and concentrated his attack there. For instance, at Ramillies the enemy had posted one wing of his army behind a marsh, it was unattackable, but neither could it attack. Marlborough let it alone, and brought his whole force to bear against the other wing, which was easily beaten. Here again is the physical superiority, telling at the right time and place, and the moral superiority obtained over a force which finds itself hopelessly out-manœuvred.

In the wars of Frederick the Great no great changes had been made in armament. The ranges were still short, the greater part of the artillery was scattered among the battalions—two guns to each battalion—and the introduction of iron ramrods was but a small improvement compared with the late change to breech-loaders. But Frederick's father had so improved the drill and discipline of the Prussian Army that it could manœuvre as an army, though very stiffly, close to and even within sight of the enemy. In his first battle at Molwitz there was no manœuvring, the two armies were in exact parallel order, and of the same strength nearly. The fight was won by the steadiness of the Prussian infantry and their superiority in rapidity of firing. But, as Frederick learned war, we see him adopting the principles of Hannibal with better means for carrying them out. At Leuthen he commanded about 34,000 men, and defeated an Austrian Army 80,000 strong by neglecting its front and centre and concentrating on its left, which he rolled up till it stood demoralized at right angles with the right wing, when the King's artillery enfiladed both wings and his left attacked the Austrian right flank as it attempted to swing round. His advance under cover of low hills against the original left of the Austrians was of the nature of a surprise, and gave him at the decisive point the advantage both physical and moral.

At Rossbach he may be said to have formed an ambush for the combined enemy. He surprised and enveloped the head of their column which was advancing in full belief of success, destroyed it and rolled up the whole army which was unable to deploy under the fire of his artillery; for by this time he had learnt the value of the massed fire of guns. Thus he obtained the superiority, physical and moral, at the important point, though he had only 22,000 men and his enemies numbered 50,000.

So far we see the same principles carried out by methods differing





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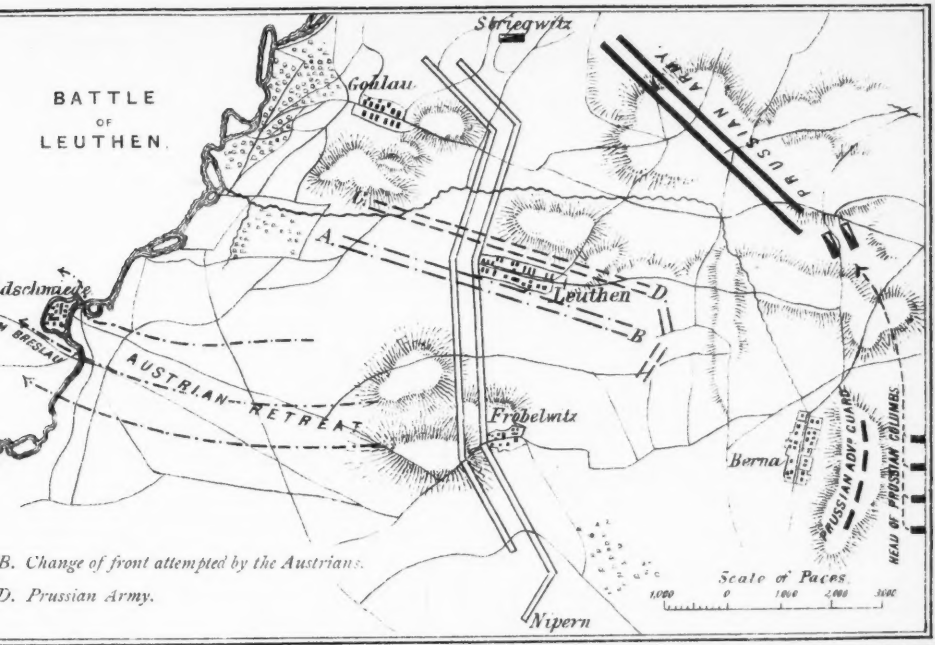
BATTLE OF LEUTHEN.

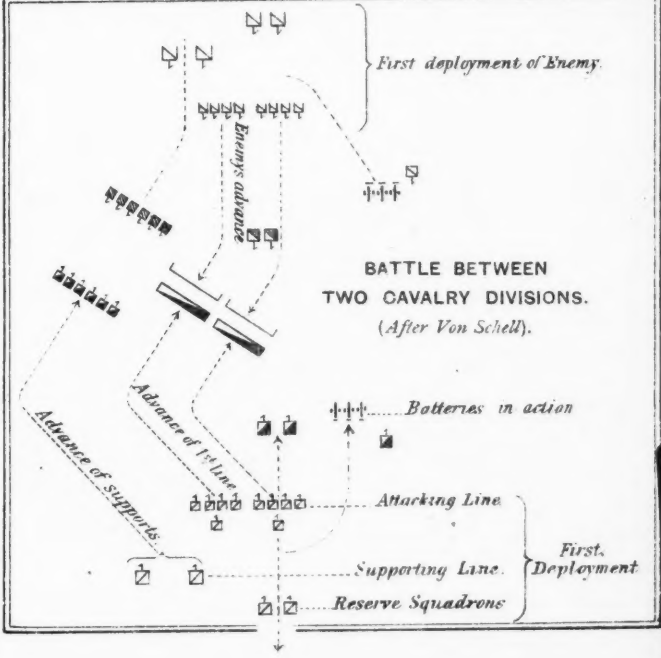


B. Change of front attempted by the Austrians.
D. Prussian Army.

BATTLE OF ROSBACH.

BATTLE BETWEEN TWO CAVALRY DIVISIONS.

(After Von Schell).



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only as progress in armaments, and in the drills based on the development of weapons differed. An army acted as a great whole only divided into two wings. Great as was the progress in drill there was still much wanting in flexibility, even considering the arms in use. But now came a great change, the offspring of Republican ideas in America and in France. In the words of Decker, "each Republican, feeling himself called upon for the defence of his country, longed to combat personally with his own good arm. The stamp of the real skirmisher was marked in every French soldier by that ardent wish to give all freedom to his natural courage. But when it was a question of force, all united in a dense mass, and disputed the honour of falling in the front rank. Hence arose the system of skirmishing; hence also the masses. They sought the most broken ground, and the combat was often decided by clouds of skirmishers, frequently indeed without any supports." It is interesting to observe that the Republican ideas of the French Revolution produced very nearly the same effects as appeared in our time in the aristocratic Prussian Army during the Franco-German campaign. It was given to Napoleon Bonaparte to organize the new force in his great wars just as all Europe is organizing a similar force now.

Napoleon and his Marshals used these clouds of skirmishers covering and supported by strong columns. The Division containing all three arms had begun to be indicated late in the Seven Years War. It was now definitely organized, and Army Corps were formed out of any number of Divisions according to circumstances. Their commanders had considerable power of initiative, and thus great armies became vastly more flexible. Flanking movements could now be executed by what were practically small armies complete in themselves, or, as was more frequently the habit of Napoleon, a weak part of the line could be broken through, and the rest of the enemy rolled up towards one or both flanks. Napoleon also introduced the offensive action of field artillery, handling masses of guns with extreme boldness. All the armies on the Continent trained on the tactics of Frederick went down before the new manœuvres, which were based on the two principles—flexibility of infantry, and the bold use of artillery for offensive purposes.

But the weapons both of infantry and artillery were only slightly improved, and it was still possible for infantry to remain in formation fully exposed till an enemy came within charging distance. As France gradually exhausted herself by her many wars, the individual value of the soldiers decreased, and there was an abuse of the formation in heavy columns. The steadiness of English infantry, after Wellington had trained it under his own eye, enabled our great General to oppose to the skirmishers of the French a more solid formation than theirs, and to their columns a greater development of fire. Wellington and Napoleon never met until the vigour of the Emperor was waning. And when they did meet at Waterloo, though our troops behaved magnificently, the battle was virtually decided by the attack of the Prussians on the French flank.

Nothing new in tactics was to be learnt from the Crimean War.

The British infantry was much better armed than the Russian, and, even if it had not been so, the Russian heavy columns, without clouds of skirmishers, were sure to be beaten by the development of fire from the English line. Only two things are to be observed—that the English line got into confusion whenever it advanced over broken ground, and that the turning points in the two great battles of Alma and Inkermann are marked by the independent use of artillery.

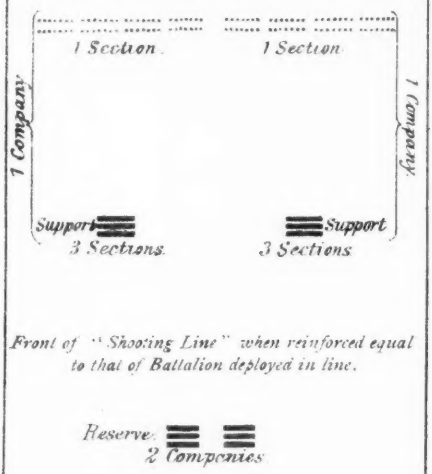
See, then, how we have advanced from the Greek phalanx and the Roman legion, more flexible than the phalanx, omitting the desultory slow wars of the middle ages, through Marlborough's strokes with armies almost immovable on the field of battle, to a time when, under Frederick, small armies were handled close to the enemy with considerable ease, then to the revolutionary clouds of skirmishers and heavy columns, armies being broken up into corps, divisions, and brigades. Field artillery enters into the arena as an offensive arm manœuvring outside the infantry, and creating great effects by acting in masses. It is unnecessary to waste time in giving instances of this. All soldiers know the Napoleonic system, and that there were battles, as for instance Friedland and Hanau, which were distinctly won by the advance of masses of guns to close quarters with the enemy.

We have now arrived at a period when those great changes in weapons began which have since modified profoundly the whole scheme of tactics. First came the infantry rifle with its sudden increase of range, fivefold, from 200 to 1,000 yards. Many a prophecy was made that the days of cavalry and artillery were numbered. Certainly, the relations between the three arms were altered; but ere long rifled artillery was introduced, doubling the effective range of the guns, and since then there have followed breech-loading rifles with range still further developed and improved rifled ordnance. How have these weapons affected modern tactics, and what is the general result as forced upon the minds of tacticians by actual war?

A few months ago it would have been necessary to advocate the claims of the spade to a place in the equipment of infantry. It is now adopted throughout Europe, and the chief point is to practise the men in leaving cover quite as much as in making it.

Let us first speak of the most important arm, and exclude the others. Putting aside special cases to which we shall come presently, the first effect of firearms so greatly improved in range, accuracy, and rapidity, is undoubtedly to delay the final shock which decides the combat, and in many cases to get rid of it altogether, because one side or the other has established its superiority, and so oppressed the spirit of the antagonist that he retires before close quarters are arrived at. It used to be common to reserve infantry fire till the enemy was within 100 or even 50 yards, and over such a short space it is easy to charge; but men cannot charge for 1,000 or even 500 yards, to say nothing of the extreme ranges now sometimes advocated—2,500 or 3,000 yards. There was once a time when the Italians had brought their style of fighting to such a pass that armies manœuvred and manœuvred, each according to the strictest rules, and hardly came to blows at all, or if they did, recognized at once which side was the

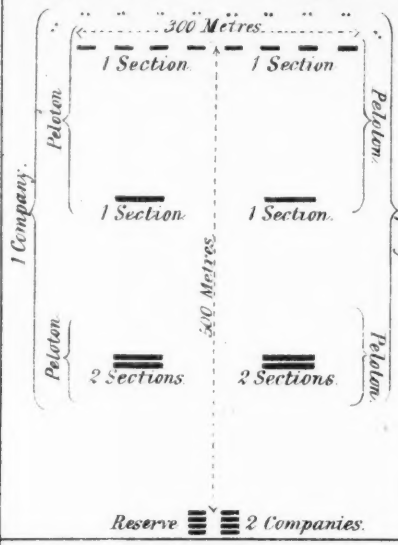
AUSTRIAN BATTALION IN "ATTACK ORDER."



Front of "Shooting Line" when reinforced equal to that of Battalion deployed in line.

Reserve
2 Companies

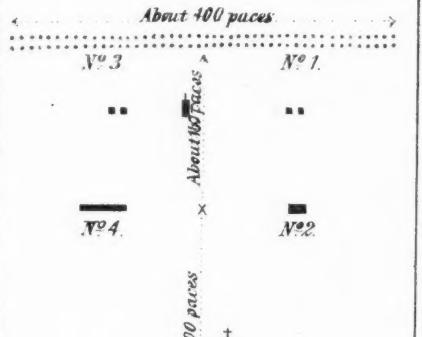
FRENCH BATTALION IN ATTACK ORDER.



ENGLISH BATTALION ATTACK.

1ST STAGE.

(Say 2,000 yards from Enemy's position.)



1ST STAGE.

Advanced Guard reinforced by Divisional Artillery driving in the advanced posts.

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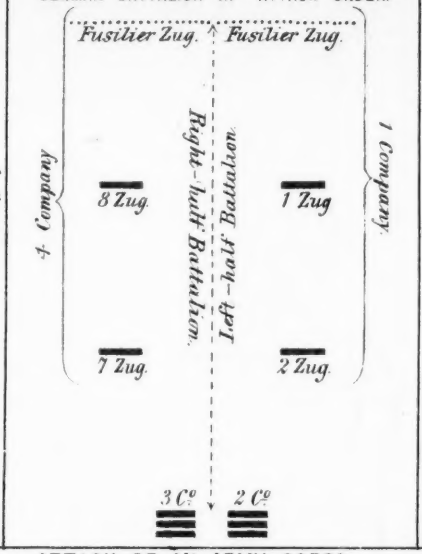
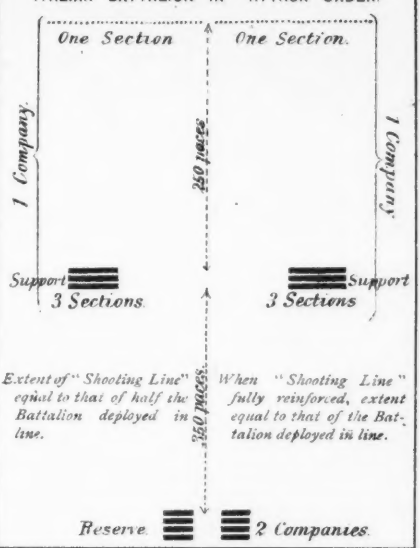
GERMAN BATTALION IN "ATTACK ORDER."



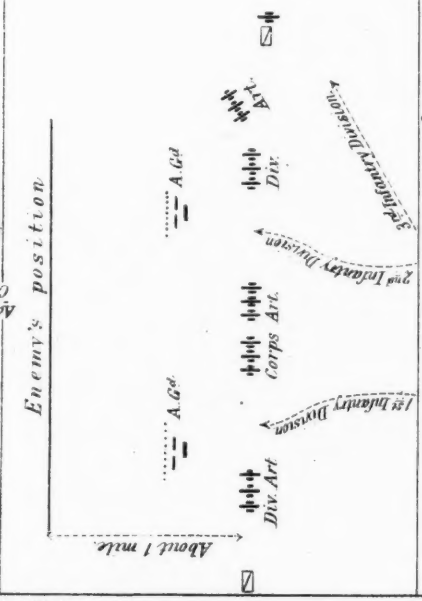
ITALIAN BATTALION IN ATTACK ORDER.



ATTACK OF AN ARMY CORPS

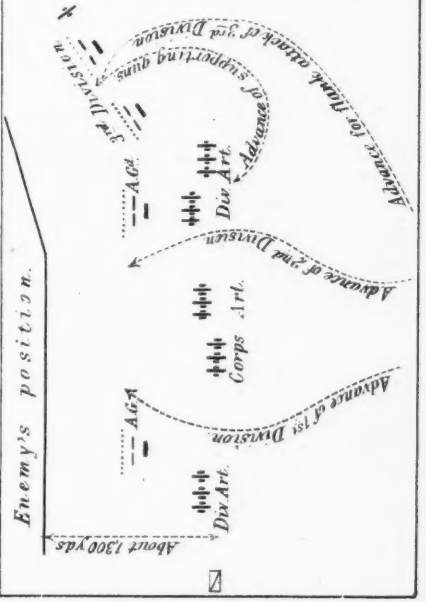
2ND STAGE.

The Artillery Duel. Subsequent Infantry advance.



3RD STAGE.

The Enemy's Guns being partially silenced, the Infantry advance followed up by the Batteries, and a flanking attack commences.



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stronger, and the weaker retired with losses ridiculously small. But Italy was invaded by troops far less highly trained, only imbued with the idea that the soldier has to get at his enemy and beat him well. The result was not favourable to the Italians of that day. It may be said with some assurance that a similar fate will befall that army which trusts to long-range infantry fire, and seeks to fight in that manner. This is certainly the general belief among the Germans, and they have had pretty good opportunities of forming a sound opinion, based upon practice. Suppose that my arm were long enough and strong enough to throw a stone over the top of St. Paul's, and that I have an enemy up there, I might stand below and pelt him for a month without effect. He would simply get behind the cupola. If I want to beat him thoroughly I must go and seek him there. There may be occasions now and then when specially trained marksmen will be of value at long ranges, but they will never drive away the enemy's troops. Nothing but actual contact or the dread of its imminence will make him run away. There must be either the physical struggle or the moral effect produced by the approach of it. How long did the Russians bombard Plevna without effect? Do you think that the Egyptians would have broken up as they did, if our lads had fought at long range?

Excepting the few cases in which long-range fire may be useful, the general opinion is that the great power of the modern breech-loader, due to the rapidity of its fire and the flat trajectory of the bullet, makes the last 800 or even less, say 500 yards, of advance so extremely hot for the enemy that he arrives, if he arrives at all, cut to pieces by the drift of lead, weakened in numbers, and with all the devil taken out of him. What under such circumstances would happen to the trim lines of Frederick, or the heavy columns of the past? They would be lines and columns no longer, and the men taught to trust to those formations and the familiar touch of a comrade's elbow would have no formation at all, and very likely no comrade. Nor is the jogging together of elbows at all favourable to accurate shooting.

If, then, formation must be destroyed, and shooting is all the better for plenty of room, the infantry soldier must come to an open order style of fighting, and his teachers had better recognize the fact and train him so that he will not be astonished when the moment of trial comes. This necessity is at the bottom of all new tactics for infantry. The open order was not evolved out of the brains of library students; it made itself on the field of battle, when for the first time German troops, then the most stiffly drilled in Europe, faced the French Chassepôts in 1870. But a whole battalion extended in open order would be ridiculously out of hand, and immediately mixed up with other battalions coming up behind to its support. So we come, not by abstruse reasoning, but by the pressure of irresistible facts, to the kind of formation for an infantry advance which is now practically the same throughout Europe. First a chain of men advancing in open order, and covering a front which is about that which would be occupied by the battalion if it were in line, then supports, one for

each wing, then a reserve. By this means the battalion has all the ease of movement of a column with even greater power of seizing advantages of ground for approach under cover; while, by reinforcing the front line from behind as the enemy is approached, the full development of fire possible to a battalion can be obtained, or if the battalion is acting independently, the reserve can be used for a flank attack, or to bring a preponderance of power to any part of the front at a critical moment. There is here nothing strange, and certainly no departure from the regular course of development during hundreds of years. By reason of the modern rapidity of fire, the front line is quite as powerful as the old three-deep shoulder-to-shoulder line of Frederick; each man having the full use of his arms and legs, and, therefore, of his weapon, is strengthened and as it were multiplied while the commander of the battalion keeps, to the last possible moment, control over a reserve which he can throw into the fight when and where he will. He must be a tactician to meet his responsibilities well; but this also comes in the regular order of progress. General education is more widely diffused than of old, nobody can get on without it. Why should military education alone be the province of a select few? Of one thing we may be quite certain, if an Officer who has been long enough in the Service to command a battalion has not acquired the power to handle it with an eye to tactical advantages, he is never likely to be fit for higher command in war. We might as well take a steady church-going solicitor and make him Archbishop of Canterbury.

Only one or two remarks are necessary on the formation of the battalion shown in the diagrams. The Austrians, the French, and the Italians have practically the same. The companies, nominally 250 men strong, are divided into four sections, of which the first leads, and is gradually reinforced by the others, so that there is no mingling of different companies till the reserve comes into play, and not even then if it acts on a flank. There is thus the moral advantage that all the men know and trust each other well, and the *esprit de compagnie* is preserved as long as possible. The German formation is similar, but the company is originally formed in three zugs, which have really descended from the old three lines. The third is called the Fusilier Zug. These fusiliers used to be the best shots in the battalion, and still occupy the third line until the formation for attack takes place. But the principle is the same in the German Army as in the rest. Shooting line, supports gradually absorbed in the shooting line, and a reserve kept in hand as long as possible. Mixing of companies to be avoided.

The English battalion, as we all know, has eight companies instead of four, and the result is that in our attack formation No. 2 company supports and reinforces No. 1, and No. 4 acts in the same way for No. 3. Here is a clear violation of principle, and the only remedy, short of increasing the size and diminishing the number of companies, would be either to have the first four companies side by side, each company having its own shooting line and supports, or so to bind the companies together in pairs that each pair shall always act

like one company, and, in fact, form one, except in name. As matters stand, we sacrifice the great moral power of accustomed comradeship, and mix different, perhaps rival, companies long before Continental nations mix theirs. I venture to submit that this is a serious matter, and something very like organizing disorder. It is impossible to rate too highly a true *esprit de corps*, extending even down to companies. A good many of us have suffered awkward wrenches to *esprit* of late years, and deserve every sympathy, though the change was for the good of the Service. But, surely, *esprit de corps* does not rest only upon names and facings. If it did there would be something very wrong about the spirit of the Army. The solid foundation must be the belief of every Officer and every man that his comrades there assembled, at that point of time, are noble and trustworthy, capable each one of doing his own duty in his own sphere, and ready to lay down his life if necessary, but, far preferably, to preserve it and that of the rest by well-directed boldness and readiness to help. This kind of *esprit* must begin in the company, and I confess to some feeling against the rapid mingling of different companies in the English attack formation. I have not come here to criticize its many points admitted to be doubtful. It is a great improvement upon the old stiff line, but may, I believe, be characterized as in a state of transition.

I would now invite your attention to some points involving principles. In the first place it is impossible to say, and nations experienced in war do not say, at what distance from the enemy the attack formation must begin, nor the exact distance between the various portions into which the battalion is divided. All must be according to circumstances. You might as well ask a housekeeper what she generally orders for dinner. Battles are now, for the most part, fought on anything rather than smooth plains, and perhaps the reply nearest to the truth would be—the formation begins when the fire of the enemy, or any other cause, obliges the infantry to leave the roads and begin to press forward across country; and the distances from front to rear must depend upon circumstances, the rule being that "behind every extended line there should be a closed body near enough to give timely assistance, but, if possible, not exposed to the same fire."[1] All Continental nations agree that the shooting line should work by groups, each of which may be extended or contracted according to circumstances. The Austrians, who suffered most from the old evil of rigidity, now, most of all, give freedom to the leaders of groups. It is also agreed that the smallest amount of men possible should be extended in front at first so that the commander of the battalion may retain full direction of the movements as long as possible. For the same reason, and in order to keep as much solidity as may be, one-fourth of the battalion at least is always to be held in reserve to the last moment.

And now, with regard to the method of delivering fire, a point of great importance. Success in war is based upon a clear reading of

[1] "Outline of the Attack Formations for Infantry." Intelligence Branch, 1881.

the facts of human nature, and among those facts none are more certain than that the tendency of mankind is to yield before audacity and enterprise. These qualities were present in the French system which overthrew the old regularity of Austria and Prussia. By audacity Frederick the Great defended himself for seven years against a world in arms, and issued victorious from the struggle. To attack is to begin with a moral advantage, and this principle is now so fixed in the minds of the Germans that they endeavour to give not only their movements but their fire itself an offensive character. Slow, continuous shooting has not that character, and a rapid fire sustained for a long time would exhaust ammunition. They prefer, therefore, angry outbursts of energetic action, showering many bullets for a short period, with intervals of ominous silence, during which the smoke clears away and ranges are corrected. Evidently, in this way the rifle fire can be kept under perfect control until within short range of the enemy, and it is believed that the spirits of the men will rise and those of the enemy be depressed in proportion, just as an actor creates in himself and his audience the passion which he simulates. Used in this manner magazine rifles may become of the greatest importance in war, and though I believe that the statement of the complete adoption of this arm by the Germans is somewhat premature, they have gone further towards its employment than other nations. If magazine arms are placed in the hands of infantry without some such regulation as this, there will be a great and probably wild expenditure of ammunition. The same idea of quick bursts and pauses of fire now prevails in nearly all armies, only the fashion of carrying it out varies a little.

Concerning the distance at which fire is to be opened there is also an approach to agreement, though in practice it will be found that the Latin races will commence earlier than the German or Russian. We may, however, take the following as giving the leading characteristics. Within the limits of infantry fire there may be said to be three zones —of short, middle, and long range respectively. The long range commences at 1,200 mètres or thereabouts and goes down to 700. Within this zone all firing must be under the strictest control, whether the men are in open or closed order; they will only fire at a given large mark, such as a column of infantry or cavalry or a battery of artillery; and the sights of the rifles will be raised to three different heights so that at least some of the balls may strike. It is not pretended that there can be accurate shooting at this distance. The number of cartridges to be fired is named, just as in the usual artillery practice. In the middle zone objects of less dimension may be fired at; but the exact target is always ordered, and the sights will usually be raised to two different distances. At this range the firing line will almost always be in open order. Under 400 mètres commences the short range zone, and here, though the fire is controlled as much as possible, and the offensive bursts of angry shooting are still considered valuable, the men are allowed to select their own marks. The *Schnellfeuer*, that is, the undirected rapid fire, is only permitted in exceptional cases, and usually for a very short period.

On the whole the general principle of the Germans, who undoubtedly give the tone to modern tactics, is not to open fire at all if it can be avoided above a range of 400 mètres when on the offensive, and not over 700 mètres when on the defensive; to keep the firing of the men under the very strictest control, and only to allow of rapid uncontrolled fire in exceptional circumstances, such as cavalry or sudden flank attacks.

Well, then, we have begun with feeling the way by a few troops comparatively, either a regular advanced guard or the head of an attack formation acting as an advanced guard, fire of an offensive character opened not too soon, and a more rapid fire sustained according to circumstances at shorter ranges, the men always pressing on, reinforcing the weakened shooting line, while a reserve is held in hand till the last moment. What now? If the enemy runs away, well and good, but probably he waits, hoping that you will run away. Now is the moment to test the skill of the commander in detecting a weak point, flank, or whatever it may be, and throwing a strong force against it. Now is seen the innate courage of the men, and the effect upon it of careful training, of a good Commissariat, and, above all, of their relations with their Officers. It is a very ugly thing to attack against breech-loaders, but it has to be done. Take your heart and throw it among the enemy, as Douglas did that of Robert Bruce, and follow it with set teeth determined to win. If you are a true soldier, if your men believe in you and you in them, they will go with you and stay with you. Is the tie between you and them stronger or weaker than the same binding force in the adversary's ranks? All depends upon that, for at this last supreme moment it is moral force which will most prevail. One side must give way. Swear that it shall not be yours. And it is to be remembered that if the struggle is severe, and tells on numbers and spirit, the same forces are tending to depress the enemy, and who knows but that a last desperate effort made by any Officer in whom the men believe may break the back of the enemy's resistance? Let us, then, hold fast by the principle that all the devices of tactics, all the means in use or suggested, have but one object in view, namely, to bring to close quarters with the enemy a force superior to his, superior, if possible, in numbers, but, above all things, superior in that moral force which all our peace training is intended to produce.

Let us now think a little about artillery, and I take it before cavalry for a reason which will soon be apparent. Some years ago I had the honour to read a paper here on the "Tactics of Field Artillery,"[1] and I now see no reason to modify anything I then said. Especially would I still advocate the use of portable shields. There is, however, a very remarkable inclination in the British Army and, I believe, in that alone, to underrate the power of this the youngest arm of the Service, an arm which did not come into full favour till the time of Napoleon, was systematically ill-used by Wellington, fell almost into contempt when the infantry received rifles and the field guns remained

[1] "The Tactical Power of Modern Field Artillery," vol. xx, No. LXXXVI.

as smooth-bores, leapt again into high fame during the Franco-German campaign of 1870–71, declined again in popular estimation, though not in that of well-informed tacticians, in the Russo-Turkish War, and has now been so much improved that nothing yet known in the history of war will compare with its effect on the next great Continental struggle. For since then not only have the guns been much improved, but good shrapnel has been introduced by every Power, and, supposing the conditions favourable to artillery fire, the man-killing power of that projectile is something like ten times as great as that of common shell.

And what was the effect of common shell in the battles between the French and Germans? On this point nothing better has been written than a short paper by Colonel Lonsdale Hale, which will appear in the April number of this Journal.[1] His careful analysis shows that the arguments which have been based on the alleged slight physical effect of artillery fire in the campaign are completely void of all significance. Pray read Colonel Hale's admirable paper for yourselves. He points out that the French guns were inefficient (and it is also true that they were timidly handled), that the time-fuzes they used would only burst their common shells at two distances, namely, 1,500 and 2,800 mètres, and shrapnel at four ranges, which lie between 500 and 1,300 mètres. Moreover, at Gravelotte, which is always quoted against field artillery, the great attack against St. Privat was resisted mainly by the French infantry because their artillery was at the time overpowered by the contest with the German guns, and, besides, had almost exhausted its ammunition. Almost exactly the same circumstances appeared in every battle—the French artillery had been overpowered before the German infantry began to enter upon the real struggle. If, then, there were few guns ready for these final struggles, how could it be expected that the losses by artillery fire could be otherwise than small?

But Colonel Hale then turns to the other side and shows that the Germans, even without shrapnel, produced great physical effect with their artillery. French reports show that their losses during the whole war averaged 25 per cent. from artillery fire, and the Battle of Vionville presents to our view a case where the French were greatly superior in infantry, which carried a better weapon than the Prussians, who yet, by their superiority in artillery, defeated their enemy and inflicted on him losses greater than their own, chiefly from artillery fire. No one can say what will take place when good shrapnel is extensively used, but this at least we do know, the armies which have been engaged in these Continental wars have since increased the proportion of their field artillery, and placed the action of that arm among the most important tactical forces.

Though artillery is a long-ranging arm, its full power is only developed at comparatively short distances, and, as infantry reserves its fire and endeavours to come to close quarters, so does artillery, according to modern tactical lights. The question of range must be affected by the possibility of finding good positions to fire from, but,

[1] "Infantry Fire *versus* Artillery Fire," *vide* No. CXIX, p. 247, *et seq.*

speaking generally, opinions are in favour of first opening fire at about 2,500 yards, and endeavouring to establish a superiority of fire by advancing gradually to shorter distance. At first the object is to establish a superiority over the guns of the enemy, and thus clear the way for the infantry advance, then to support that advance by firing at whatever most opposes it at any particular time, then, finally, some at least of the guns will go in heartily with the infantry to close quarters, and—let us be modest!—place that last straw on the back of the camel which shall break it.

It is hardly necessary now to spend breath in saying that artillery should be used, so far as possible, in masses, which shall be under the direction of one will, so as to be able to direct the fire of a large number of guns on one point at a critical time. Our old principle of tactics is here as peremptory as in any other case: to bring a superior force against an inferior force of the enemy at the right time and place. The massing of guns is an old principle now, strengthened lately by the additional range of rifled guns. A moment's thought will show that the longer the range of the pieces, the greater number of them can act on the same spot at the same time.

I have left cavalry for the last because the latest development of its tactics in the field is entirely based upon the importance of artillery and the necessity for its aid in a cavalry charge. It has always been understood that cavalry should combine a front with a flank attack, but now the prevalent idea is that in the attack of a division of cavalry the larger portions of the regiments, two brigades out of three, should incline to a flank for attack, thus leaving the front to the horse artillery, which should consist of three batteries. The horse artillery gallops forward and comes into action a little short of the point where the charge is likely to take place. This requires great judgment and nicety of execution, but is really safe, because the enemy cannot attack the guns without exposing his flank to a charge of your advancing squadrons. This manœuvre has been much practised lately both in Germany and Austria. It may be said generally that the direction of movement in cavalry tactics is to develop the action of the horse artillery. The diagram is taken from Von Shell's book on artillery tactics.

There is no tendency to count the days of cavalry charges on a field of battle as numbered; on the contrary, there exists everywhere a disposition to make more of the opportunities which constantly occur when the enemy's troops are broken or demoralized, or when their attention is occupied by an infantry attack and cavalry can throw its weight into the scale. The latest instance is the charge at Kassassin. Small as was the scale, the principle was grandly illustrated.

But the chief directions in which the ideas of cavalry tacticians are moving are first to strengthen what is called the cavalry screen of an army by concentrating it more; and, secondly, to develop the system of raids on the enemy's communications. The German cavalry gained a great name for itself in 1870–71, but it is a mistake to suppose that the deeds of that period are considered as models for the future. The example set by the Americans and followed by the Russians will pro-

bably become a rule of war; and to make cavalry more independent, it is receiving a better firearm than of old, and is being trained to use it on foot. So impressed were the Russians by the value of their dismounted cavalry work that they are doing away with hussars and lancers and turning them into dragoons, who practise assiduously fighting on foot. There seems to be an idea in this country that such work will spoil cavalry. It would be difficult to say why, especially since raiding work, including often no doubt the attack on infantry of not the highest quality, is now recognized as one of the chief functions of cavalry.

I will now try to sketch in a rough way a sort of typical advance of an army corps formed like the English by three divisions, and a brigade of cavalry. Our example can but be a sort of diagram, and more harm than good will be done by presenting it unless we all understand that no two such operations will be more like each other than two human faces. The features may be the same in number and general construction, but each feature and each movement will have a character of its own impressed upon it by the Commanding Officer—its parent—and the circumstances under which it has taken life and growth.

Suppose, then, that the army corps advance on two roads, one division on each, with the third behind one of the wings. Generally speaking, each leading division will have its advanced guard, but cases may occur where a whole brigade, or even division, forms the advanced guard for the Army Corps. We will suppose two advanced guards, which will be at the least a mile in front of their divisions, and in communication with each other. The cavalry brigade has been checked in front by the advanced posts of the enemy, has reconnoitred as well as it could, perhaps dismounting and attacking partially on foot to draw the enemy. It now clears out of the way, and leaves the advanced guards to act. These move steadily and carefully, clearing their flanks as they go by patrol parties—far too little recognized in the infantry field exercise—and are in their turn checked by the gathering forces of the foe. It is now their business to seize good available positions for artillery, and in the first place to occupy them by their own batteries. To these positions they hold with great tenacity, expecting speedy help. Probably the General in command now comes up, and from this moment his character will stamp the movements. If he is a futile fidget he will want to meddle with the advanced guards. If he is a born Commander, he will let them alone, and study the position of the enemy. As in fencing, he should not look nervously at his own weapon or his adversary's, but try to penetrate the brain of the man he has to beat. His own blows should come almost by instinct.

Meanwhile the advanced guards have to be reinforced. By what arm? Clearly the artillery, which alone has at once the requisite swiftness and offensive power at the present range, which we assume to be some 2,500 yards from the main position of the enemy. There must be no hesitation. All the artillery must come up as speedily as possible, and fill with guns the positions selected by the advanced guards,

which will now act as a support to the guns. As the two divisions have been on parallel roads, we shall have the divisional artillery on the flanks, and the corps artillery in the centre of the line of guns. All the pieces will be together if the ground admits of it, and in any case the senior Officer present will command that mass of guns where he finds himself. All distinctions become merged. For the time there is no divisional or corps artillery, only the great battery of the army corps, or even of more than one army corps. We have taken 2,500 yards as the distance, but it will be all the better if it is less.

While the artillery duel is proceeding, the infantry may be coming up, and the intention will probably be to advance in two lines with or without a third portion as a reserve; but, what with cavalry reconnaissance and the action of the advanced guards, the Commander will probably have arrived at some knowledge of the enemy's position and strength, and will have decided on his grand tactics, that is to say, on the first step from strategy to the minor tactics which must be known and practised by every Officer and non-commissioned officer. When the artillery has obtained sufficient advantage, and the general scheme is decided upon, the infantry will begin to advance. At this point let us, above all things, avoid dogmatism, and leave to the Commander to decide how his troops shall be formed, to gain the end he proposes, namely, to arrive close to the enemy with the least possible loss, and so arranged that he will have at some point or other a preponderating force, both physical and moral; such as for instance would be given by the third division making a flank attack. In deciding upon his plan he will take into consideration the great defensive or containing power of the new arms, for instance, he will not be afraid to occupy the enemy in front with an inferior force of infantry, or by artillery, with hardly any infantry, while he strikes his great blow. Here comes in one occasion for spade work.

For mere diagram purposes, let us suppose that he makes a combined attack on the front and flank of the enemy's position. Shortly after the infantry has passed the guns, and is making towards the commencement of its first zone of fire, the artillery will advance by gradual échelon, and take up its second position, which must be governed by the lie of the ground, but for diagram purposes we will estimate to be at about 1,200 or 1,400 yards from the enemy. At this time the opposing artillery will still be the most annoying opponent to the advance, and so long as this is the case it must be fired at. The general rule is to pour shell, especially shrapnel, on that part of the adversary which is the most active in hindering the advance.

The movement will now be slow, from the necessity of advancing carefully under cover as much as possible; but gradually the first shooting line of infantry with its supports and reserves come under fire, as we have already seen in the case of single battalions, only if the frontal attack is serious, there will not only be one line disposed in attack order, but a second at such a distance behind as not to suffer much from the fire directed against the first line. The second line will be in easy marching formation, ready to form the order of attack

at any moment. The flank attack will now be developing itself, and a portion of the great battery in front will probably be detached to accompany it. One of the special features of the artillery combat is, that any portion of the line can be used when necessary for other purposes.

So soon as the infantry is fairly launched into the combat, it becomes of course the principal arm; and the duty of the artillery and cavalry is to support it in every way, and even to sacrifice themselves for it if necessary. Therefore, if, as is probable, the advancing infantry masks the guns, the artillery, or at least part of it, will not hesitate to take up a third position, perhaps half way to the enemy. Pray let us try to get rid of that idea, retrograde, hampering, and quite contrary to experience, that artillery cannot advance to within short range, say 800 to 600 yards of an enemy's infantry. No one is going to suppose that artillery could do so alone; or that if acting by itself, it would be wise to relinquish its special quality—superiority of range; but, when two infantries are engaged in a severe struggle, where is the infantry Officer who will choose that the artillery shall consult its own safety by remaining behind, and where is the artilleryman who would do so, except under strict orders? We must remember that though the comparative power of infantry and artillery fire is of course more in favour of artillery at ranges where the infantry can hardly fire at all, yet the actual power of artillery increases enormously as the range decreases. All modern tacticians worthy of the name are of the same mind; they say that though artillery will suffer heavy losses by advancing into the front line in the later periods of the fight, yet the game is well worth the candle. The physical effect of its fire, and the moral effect of the anchor which it affords, are simply incalculable, and the General who in these days does not base the idea of his attack on a close and courageous action of his artillery, is not only behind the spirit of his time, but proposes to fight as it were with an arm tied behind his back.

The first line of infantry will by degrees absorb its supports, and probably reserves at last, into the shooting line, which, thick as it is, will be checked at some distance from the enemy, will post itself as well as it can, lie down, perhaps entrench, and commence a fire-struggle, under cover of which the second line will come up in less mixed formation, and attempt to strike a blow or a series of blows. How is this to be done? The fact is that there are probably a thousand books and pamphlets on this subject. Some writers say that the second line must above all things avoid moving straight on the first, and should therefore come up on the wings. Others say that it should march over the first line under cover of the smoke produced by the latter. I take it, Gentlemen, that when your time comes for this manœuvre you will not stop very long to weigh the various tactical forms. The longer you wait, the more your men will suffer, and the more will their nervous strength be uselessly expended. I think it will be found in the end that there will be sufficient indications of the proper place to attack, and that you will go the straightest way to that place. How to advance must be governed by circumstances. On open ground, a

series of rushes in échelon appears preferable; but at any rate it is necessary to get close to the enemy, firing as little as possible meanwhile; then charge the best way you can, but, above all, wave following wave so closely that the first has not time to be broken and recoil before the second is with it to push it forward. If the attack succeeds, the artillery will be instantly pushed to the front to pursue with its fire. The attacking infantry will halt and rank itself again into steady formation, the cavalry brigade with its horse artillery will do its utmost to change defeat into rout, and keep the enemy in that state of mental agitation which will weigh more towards his defeat than all the physical power in the world. If the attack fails, it is then the business of the artillery chiefly, but also the cavalry, to engage the attention of the enemy, to draw him off from pursuing the slower moving infantry and thus enable the latter to reform its ranks.

With regard to a defensive action, the difference between the old and the new tactics is principally this: knowing that every attack will be prepared by a long artillery duel, and that it is important not to tell the enemy where the main defensive position is, the infantry will remain out of the fight as long as possible, and the artillery will occupy, if it conveniently can, a position which is not that of the main defence. As the country is probably mapped out and ranges accurately known, both artillery and infantry may open fire at longer ranges than in the attack, if it is found advisable to do so. The troops and batteries must be arranged so that the guns may take part in the final struggle. A counter-stroke must be prepared beforehand, and a general balance of advantages seems to show that the stroke should be delivered, not after an enemy's attack, because perhaps he may never be repulsed, but just as that attack is beginning to take place, so as to disorder it.

If we now consider how the whole of the preliminary work in the attack is but a means of bringing the forces into contact, and if we estimate rightly how great are the losses to which we must submit, everybody must wonder whether there is not some other and less sanguinary means of pushing an advance. Certainly there is, but it is one which requires troops of a very high order to execute it, and cannot be attempted against a first-class enemy without more practice than has hitherto been common in any army. The method is that of the night march and attack at early dawn, which was once a favourite movement, is still laid down for the assault on fortresses, and has lately been illustrated by that fine combination of thoughtfulness, care for details, and gallantry which we call the Battle of Tel-el-Kebir. No doubt the enemy was inferior to our side in most of the qualities which form the good soldier, and, above all, he had no proper outposts; yet I am very much mistaken if that battle does not mark the opening of a new era in tactics, when the difficulty of the problem of night marches will be held to be less than that of an advance by day against modern firearms.

Another point must be touched upon. It is that of mounted infantry. There is nothing new in the idea of mounting infantry upon

horses or carts, or artillery wagons, or even artillery draught horses. It is no exaggeration to say that the feat has been performed hundreds of times with the greatest advantage, and will probably be performed hundreds of times more. Every nation has acted in this manner, and every nation has lately considered the question of organizing mounted infantry in peace without accepting it. In England alone is there at present a strong agitation in favour of the measure. Why is this? The answer is simple. Because we have not nearly sufficient cavalry, and the cavalry which we have, has not yet recognized its dismounted action as one of its principal functions. By all means let us train as many infantry as we can to ride in peace, but let them remain infantry pure and simple—not even attached to horses for more than short periods. Otherwise see what you are about: you are organizing a new and bastard arm, which would in the end become bad cavalry, because you have not the courage to stand up and say that the English cavalry is deficient in number, in organization, and in training for action on foot. Depend upon it, mounted infantry, permanently organized in peace, is not one of the developments of modern tactics, though a very certain development is the supply of a first-rate firearm to cavalry and its use in a variety of circumstances which have already been pointed out.

And now, what do they all come to, these modern developments of tactics? To a form of fighting which leaves more scope to individuals of lower rank than formerly, and demands keenness of insight and a cultivated judgment on the part of junior Officers. It is the development of the same idea which trusted the thin line against the heavy column, the disciplining of the Republican swarms of skirmishers. Tactics have moved always in the same direction. First the close fighting of formed masses, then the deployment of armies in line with gradually increasing power of manœuvre. Then the commencement of the swarm tactics, supported by heavy columns; and now, with better arms, the marriage of the swarm to the line, made subtler and more flexible than of old.

A strange idea prevailed when first the new tactics were used. It was that half-disciplined troops would be able to hold their own against trained armies. Never was there a greater delusion! The later tactics demand not only high discipline and training, but a discipline of a much higher kind; a discipline of the head and heart as well as of the body, together with a mastery of the rifle and the spade. Every section of a company must have its trusted leader, and absolute confidence between Officers and men is indispensable. Necessity has lately brought about some changes in the English Army which are, naturally enough, distasteful to those who have been brought up on a different system. But are we, therefore, to imagine that the enlisted Englishmen of to-day are unequal to the tasks which are not too great for the armies of the Continent, recruited by conscription? During the Seven Years' War, there were actual gaol deliveries to form regiments. We came out of it with the addition of Canada and India to the Empire. During the Peninsular War, high bounties were paid for boys fifteen years old. Now, in

peace, we enlist five or six and twenty thousand men annually, some of them younger than we wish, but all able to grow into fine soldiers. The Army is certainly not less attractive as a profession than it used to be. Let us all strive to make it more so. Let us so train ourselves that soldiers, old and young, shall have confidence in our judgment and military knowledge. It is the warm-hearted leader whom they will follow, not the captious critic who outrages their honourable feelings, and breaks their heart by constantly proclaiming that he has no confidence in them. The point to fix our eyes upon is not the fact that British lads enlist more readily before than after nineteen years of age, but that the regiments formed of men so enlisted went through the campaign in Egypt, held their own for weeks at the thin point of England's lance, made the night march steadily, and stormed the lines of Tel-el-Kebir.

List of good modern Tactical Books.

Tactique de l'Artillerie. *Von Schell.*
" " " *Hoffbauer.*
Règlement sur les Manœuvres des Batteries Attelées. 1881.
L'Emploi Tactique de l'Artillerie de Campagne. *Muller*, 1880.
Traité d'Art Militaire. *Perizonius.* 6th edition.
Defence and Attack of Positions. *Schaw.* 2nd edition.
L'Artillerie dans la Guerre de Campagne. *Schnéegans.*
Tactique de Combat. *Brialmont.*
Aide Mémoire de Campagne. *Costa da Serda.*
Marches et Combats. *Berthaut.*
Études de Guerre. *Lewal.*
Études, Stratégiques et Tactiques. *Rustow.*
Tactique de l'Infanterie. *Robert.*
Tactique des trois Armes. *Mazel.*
Die Neu-Russische Taktik. *Drygalski.*
Die Entwickelung der Taktik seit dem Kriege von 1870–71. *Boguslawski.*
Die Fechtweise aller Zeiten. *Boguslawski.*
Manuel de la Conduite des Troupes. *Von Widdern.*
Traité de Tactique Appliquée. *Paris.* 5th edition.
Le Tir de l'Artillerie de Campagne. *Rohne.*
Taktik. *Max Thyr.*
Studien über Truppenführung. *Verdy du Vernois.*
Service Stratégique de la Cavalerie. *Librecht.*
Das Moderne Gefecht. *L. W.*
Der Kamp um Plevna. *Von Trotha.*
Modern Tactics. *Wilkinson Shaw* } 2nd and 3rd Volumes of Military Handbooks, edited by Col. C. B. Brackenbury, R.A.
Field Artillery. *Pratt*, 1883 .. }
Tactique. *Braeckman et Ducarne.*
Tactique des trois Armes. *Fisch.*
Elemente der Taktik. *Meckel*, 1883.
Allgemeine Lehre von der Truppenführung im Felde. *Meckel*, 1881.
Zur Taktik der Situation. *Von Arnim*, 1882.
Das Deutsche Feld Artillerie-Material und Dessen Taktische Verwerthung. *Kriebel*, 1882.

Colonel LONSDALE HALE: I do not know whether it is a matter of chance that the Council selected the present year for this lecture, or whether they bore in mind the saying that "tactics change every ten years." At all events, it is a curious coincidence, because ten years ago a lecture was delivered in this very theatre on

'The tactics of the three arms, modified to suit the requirements of the present day," and the Officer who delivered that lecture was the brother, Colonel Henry Brackenbury, of the present lecturer. Certainly no two Officers could have been better chosen—the one to introduce us to that decade of years, and the other to sum up its results—for the simple reason that those two Officers have probably studied modern tactics more than any two Officers in the Army. But although in one respect these two lectures are remarkably similar, yet in another respect they differ *in toto*. The similarity between the two lies in the fact that each of these lectures reflects with perfect fidelity the tone of the tactics of the days in which it was delivered; but Captain Henry Brackenbury, as he then was, stood on very firm ground. He was lecturing immediately after the close of a great war, of which we had accepted the lesson; and if war had broken out again at once we should have put the lessons which he taught us into execution. The outcome of the war of 1870–71, tactically speaking, may briefly be described as follows: first, infantry fire should be used exclusively at short range; next, the advance to the attack should be made by the formation of échelon; and thirdly, artillery possesses enormous power. But then a few years after that came the war of 1877–78, the tactical outcome of which was entirely different. Great weight was attached to long-range infantry fire; artillery, as the lecturer has pointed out, fell into the background altogether; and it was generally admitted that it was almost an insoluble problem as to how the last 500 yards in front of a position should be got over. The result of the conflict was to lead to an enormous amount of tactical controversy, especially on the Continent; and I do not think I am exaggerating when I say that the tactical world, or the world of tactical opinion, at the present time, is in a state almost of chaos: it is in a state of confusion, a state practically of anarchy, in which the only recommendation given us by our leaders is that every man is to do that which he considers right in his own eyes. Captain Henry Brackenbury, in the lecture to which I have referred, said—"Training during peace will alone enable an Officer to protect his troops from fire when he leads them in battle. Tactical formations must be decided upon in peace." But in spite of those diagrams on the wall, we know that tactical formations have not been decided upon at the present time. And that brings me to the characteristic of my friend Colonel Charles Brackenbury's lecture, in which he puts before us most plainly that truly everything is in a state of doubt. I do not know what the sources are whence Colonel Brackenbury has derived his information. Probably it is not only from the periodical literature of the Continent, but also from the regulations in Continental armies; in fact, that he has consulted the regulations of Continental armies, I am perfectly sure from one sentence which occurs in this lecture. Speaking about the distances at which the attack formation should be adopted, and the distances between the various portions into which the battalions should be divided, he says—"All must be according to circumstances." Now, there are a series of most interesting lectures coming out in the "Revue Militaire de l'Étranger," in which the writer complains of this characteristic of all typical regulations in Continental armies. He tells you that with one hand they give you a stick to support yourself, and then with the other hand they take that stick away from you. He tells you that in one page or one paragraph of their regulations (and the Germans, as well as others, do this) they lay down what they call a normal formation for the attack of the brigade or division, and then in the very next paragraph they calmly and deliberately tell you—"Yes, we have given you this formation: we recommend it to you for adoption, but for goodness' sake do not trust to it. You may have to throw it away altogether and evolve something for yourselves." Colonel Brackenbury has in other parts of the lecture truly caught the spirit of the existing state of the tactical world. Further on, dealing with the very important point, how to approach the breech-loader, the only recommendation he can give us is that we are to "take our heart, to throw it among the enemy and follow it with set teeth, determined to win." That literally sums up what we are told to do in Continental armies. Then, again, further on, after telling us how to bring up a line to the attack, he says—"There are probably a thousand books and pamphlets on this subject." "But, under the circumstances," he continues, "I take it, gentlemen, that when your time comes for this manœuvre, you will not stop very long to weigh the various

tactical forms; in fact, you would put them away altogether." And a little further on, speaking of the most difficult of all operations to be carried out, namely, a counterstroke, the only advice he can get from his wide range of reading is to tell us that "the counterstroke must be prepared beforehand." This is literally all that is contained in that paragraph. Now, there is not one tactical writer on the Continent who does not tell you that. They tell you the counterstroke is an absolute necessity; they own it is the most difficult operation a commander can be called upon to carry out; but I cannot call to mind one single tactical writer who gives you the slightest hint as to how you are to do it. Colonel Brackenbury also complains of our asking for a few tactical forms. He says—"You might just as well ask your housekeeper what she generally gives you for dinner." Now, I am not a big enough man to keep a housekeeper, but Mrs. Hale kindly orders my dinner for me; and if any gentleman will ask her what she orders, I will tell you what her answer will be. She will say, "I cannot tell you in detail, but all I know is it does not do him any harm, and he rather seems to thrive upon what I give him." The military housekeeper, however, if he is asked the question, will say, "Here is what I call a 'hash of sorts,' that is all I can give;" and he will continue, "I am not at all sure it will do you much good, but at the same time very possibly it may do you very great harm, and you may be dead five minutes after you have begun to eat it." But there is a very sound and obvious reason why there is so much doubt and hesitation as to the tactics of the future; and that reason was given most admirably by Captain Henry Brackenbury, from whose lecture I quote again, and it is to that that I wish to call your special attention. He says, "In order to arrive at true tactical forms, the effect and power of fire must be truly estimated, otherwise false tactical forms are sure to be employed." That is just how the case stands. At the present time nobody can predict what the exact power and the exact effect of the fire of the future will be. If you take either peace experiments or the results of the war of 1877-78, the result is simply appalling. The latest development of the ideas with regard to military fire is given in a recent number of the "Militar Wochenblatt," where there is a review of a work by a German Officer; and one of the axioms with which that Officer starts is that a properly equipped battery ought to be able in a quarter of an hour to annihilate the smallest object in front of it at 1,100 yards. If that be true, and if there is anything in the experiments of peace time, the result will be mutual annihilation, history will repeat itself, and we shall come again to the battle of the cats of Kilkenny. But although there is so much darkness in the tactical world at the present time, still it behoves those of us who have studied the subject to see whether we cannot find something to indicate the right path, and therefore I venture to touch upon one or two points on which I differ from Colonel Brackenbury; and what has hurt my feelings most is his differing from me on the question of long-range infantry fire. I know it is no popular matter in the Service; I know it is not popular with the Germans. I am not going to quote from the peace experiments at Dungeness. I will only mention one case which occurred at Aldershot, where a party put some 56 per cent. of their shots into a battalion column at 1,700 yards' distance, although, owing to the weather or the nature of the intervening ground, they did not see what they were firing at. What I wish to refer you to is to the experience of the wars of 1870 and 1878; for I am not a theorist, I simply cite what has actually happened. Colonel Brackenbury has alluded in too eulogistic terms to a little paper that I have written on the subject, and if you turn to that hereafter you will find something about the effect of the Chassepôt at the battle of Gravelotte. But if you do not believe what I have written, go to the battle-field of Gravelotte, stand on the ground, and see where long-range fire was used at 2,000 yards with absolute deadly effect; and then come back if you like and say that there is nothing in long-range fire at all. I again appeal to facts, and I say, suppose you are attacking earthworks, and suppose you have 10,000 or 12,000 Englishmen going up against a line of entrenchments, why are your troops to suffer less than the Russian troops who went forward in the same way? And we know that according to General Todleben's account, from 10,000 to 12,000 Russians were so overwhelmed at a distance of 2,000 yards that in a short space of time they were reduced to 4,000 or 5,000 men. I want you to tell

me why those Russians fell. Tell me why those Germans fell at Gravelotte, and then try and explain why, in the future, you are not to make use of this particular kind of fire, a fire which I venture to assert will be a most important element in the tactics of the future. Colonel Brackenbury has used an illustration which has come home to me with singular force. He has spoken about supposing his arm being long enough and strong enough to throw a stone over the top of St. Paul's, and that if he has an enemy there, he might stand below and pelt him for a month without effect. Quite so—that is what the man in the churchyard says; but how about the man at the top of St. Paul's? What is his view of the case? I do not know whether Colonel Brackenbury has ever been to the top of St. Paul's, but I have. I have stood on the top of the cross, and in order to get there, I had to climb up some hundred feet of most unpleasant ladders. If my enemy had been on the top of the cross, I only wish, when I was at the bottom of those ladders, that he had been a convert to Colonel Brackenbury's views as to short range; I only hope he would not have pelted me with stones when I was down below. I only hope he would have waited until I got within 20 feet of him, within striking distance, as it is termed, and then, although I should have blessed him openly for his kindness in not firing at me, in my sleeve I should have said something barely polite as to his intelligence. Then we have another point with regard to the mixing up of companies. I am sorry that Colonel Brackenbury has yielded one iota to that sentiment. I cannot help thinking that the idea of not mixing up companies is a sentiment most valuable in peace time, but which will not for one moment bear the strain and the wear and tear of Continental warfare. It is a point which occupies the attention of regimental tacticians to the exclusion of weightier matters. I will give you a few facts. I know that the idea of the integrity of the company is an old and valued tradition in the British Army; but it has derived very great support of late years from the idea that much of the efficiency of the German Army in war is due to the company system. I venture to say, and I say it in the presence of General Sir Beauchamp Walker, that it is only in peace time that the company system has its great value in the German Service. I can tell you what took place with regard to one regiment. That regiment was a thousand strong at the time of mobilization. On being mobilized it received into its ranks 2,000 fresh men; that is to say, every company has two-thirds new men. How could they, as Colonel Brackenbury has said, "each section look to its trusted leader?" But with regard to the Officers the facts are still more remarkable. Fifty-three Officers accompanied that regiment into the field of battle. Of these fifty-three Officers there were only thirty who had been with the regiment during peace: twenty-three were collected from other sources. Of those thirty Officers there were only twenty-six who were allowed even to remain with their own battalions, the others being transferred. Out of the thirty Officers among the twelve companies there were only sixteen who remained with those same companies; while out of the twelve fathers of companies, I think you are accustomed to call them in England, there were only five who were allowed to lead on to the battle-field the men whom they had trained in peace time. The regiment I am referring to is the Queen Elizabeth Regiment of Guards. Follow that regiment in its career and you will find it was at Gravelotte and Sedan. It had also some of the very hardest work round Paris, and was second to none in efficiency. The way it behaved was equal to that of any regiment in that Army, although it was working practically under strange leaders. The fact is that the *esprit de compagnie* must be merged into the *esprit* of the higher units, and eventually into the *esprit de l'armée;* and surely in no Army in the world is that merging of it into the higher sentiment more required than in an Army which has in its ranks, fighting side by side, Englishmen, Scotchmen, Irishmen, Welshmen, and the native troops of India. What I may have said with regard to the general indecision which prevails in the tactical world may be educed by some of my weak-kneed brethren into the determination no longer to study tactics, but to trust to the inspiration of the battle-field. Now, it would be foolish on my part, and absurd at the close of my military career, if I were thus to so stultify all my efforts of the last few years, to induce my brother Officers to study their profession, and specially to study tactics, and therefore I do not wish to be misunderstood. If they will accept my advice it will be this:—When you have studied elementary

tactics and mastered those, shut up all your books upon theoretical tactics: for goodness' sake do not get involved in those endless controversies which now prevail in the tactical world, for they can but lead to indecision when it comes to your turn to act. I will ask you to turn to the practical tactical deeds which have actually taken place upon the battle-field and study them. I would ask you to turn to those records of the regiments of the German Army which now lie close at your hand; read them; and you may find what corps did and what divisions did, but you also will find what companies did, and you will find what mere sections of companies did under leaders whose sole claim to authority was that the men under them can trust them. If you were to go over the ground where these scenes have been enacted, you would find that these small units have turned the impossibilities of theoretical tactics into the actual accomplished facts of victory. When you have got your minds saturated with these facts, then if your hearts are in the right place and your heads are cool, you will be able to undertake charge of the lives of your fellow men, and then will I join hands with Colonel Brackenbury in recommending you to follow the advice given us now on all sides to act "according to the circumstances of the case."

Colonel Fox Strangways, R.A.: I have no intention to detain you very long, but there are one or two points which Colonel Brackenbury has mentioned upon which I think a little further explanation may be necessary. He has laid great stress upon the necessity of pushing forward artillery as far as possible, and of taking advantage of cover; but he has rather thrown doubt upon the necessity of keeping under cover in coming into action. I refer to what he said as to the first artillery position. Now Colonel Hale has justly said, with regard to the effect of artillery, it is probably impossible to go into action at anything like close range against a well-posted artillery using good shrapnel, and, therefore, we have to resort very much I think to the practice of bringing artillery into action completely under cover, and it may be necessary to take rather a longer range than Colonel Brackenbury seems to think. There is another reason why it may be necessary, and that is because an oblique fire or an enfilading fire against troops in an entrenched position is very much more effective than frontal fire. But the main points on which I wish to make a remark is that relative to the later stages of the fight. Colonel Brackenbury has justly said that artillery ought to be pushed forward to obtain success; that everything is to be sacrificed. Now I should be the last person in the world to deny that; but the only question is, whether on the field of battle there is likely to be room for artillery being pushed forward at these close ranges of, say, 600 yards? and considering that artillery is as effective at 1,500 as 600 yards, I think we should consider whether the range at 1,500 is not much better, and for this reason, the artillery remains in the position which it has taken up, and has not the trouble of moving. It is not exposed to fire as when moving. It is able to fire over the heads of the infantry, because as soon as the infantry get to 1,000 yards they are perfectly safe from any premature shell. If a shell explodes it will explode at the muzzle of the gun; and, therefore, we could maintain a shrapnel fire at 1,500 yards, while the infantry are attacking at distances from 1,000 to 300 yards with absolute safety, and then take up percussion shell and continue it to the last moment. I would ask whether that is not the best position at which artillery should remain, with the exception of certain batteries which might be pushed forward in order to conduct success into victory? The question I would like to ask is, whether it is possible to have artillery moved forward with the infantry attack, and whether it is not better to remain in the second position with the greater part of the artillery? With regard to the question of exposing artillery, it appears to me to resolve itself into this: in an attack we want to preserve our artillery for future use; that is the reason why we would not press it forward into greater danger than necessary, so that we may not lose the horses in the first instance. The time when tenacity is to be displayed is in defence. Then the artillery holds out to the last moment, and if guns are lost they are lost rightly. The combined advance of artillery and infantry together may turn any frontal attack; for if they hold fast with extreme tenacity the attack will probably not be able to push home. But the desire to push forward to very close range in attack seems to me unnecessary and dangerous to push to an extreme.

Major CARMICHAEL, 5th Lancers: Colonel Hale has rather found fault with the Germans for leaving discretion to their Officers in action in spite of all that has been taught. The Regulations say: "Further detailed regulations and schemes are not admissible. It would not be possible to present every conceivable case, while the disadvantageous result might easily ensue that more attention would be paid to the formation laid down than to the attainment of the object itself." That I understand to be that you are to adhere to rules as long as you can; but that, if you are driven to adopt a method of your own, you must be prepared to do it; and we are told, it is a favourite practice with some German Officers to order their men to execute movements that they have never seen before, and which are sometimes acturally contrary to regulations, and to expect them to do it on the spur of the moment. The next point on which I wish to speak is the position of the magazine-rifle question. Colonel Brackenbury is right in the main in saying that the Germans are taking the most advanced position in that respect, for among the *great* Continental Powers Germany is no doubt in advance of any other, but Switzerland has already actually adopted a magazine-rifle. Some time ago a magazine-rifle, the "Löwe," was tried by the Germans, and it was believed that the casting vote was given against it by a General von Gross, commanding Third Army Corps, who was afterwards killed by a fall from his horse; for when he was killed it was mentioned that the magazine-rifle was rejected owing to his vote. I understand that three regiments are now armed with an adaptation of the magazine to the Mauser rifle. But I believe there is no immediate intention on the part of the Germans to issue this rifle to the whole Army. They are waiting to see what the French will do, and they know that there will be plenty of time to make their rifles when the necessity arises. As far as theoretical opinions are concerned, on the last page of a book, called "Repeater Rifles," it is stated "That the infantry which first introduces a repeater rifle, in connection with a canister cartridge, will have as great a superiority on the battle-field of the future as, in the year 1866, the Prussian needle-gun possessed over the Austrian muzzle-loader.

The CHAIRMAN: What are you quoting from?

Major CARMICHAEL: From a German book advocating the introduction of the magazine-rifle. It is a book that came out during the controversy occasioned by the appointment of the Prussian Committee, and in it the arguments used against the magazine-rifle were combated. With regard to artillery coming into action with infantry, I may perhaps be allowed to quote what some recent modifications of the German Regulations say: "Under some circumstances it is of great value, particularly on account of its moral effect, and therefore is admissible that artillery should accompany the infantry," and so on; they do not say it is a thing that ought to be done, but it is "*admissible* under certain circumstances"; and General Goeben, who commanded in many of the battles in the north of France, when the Germans were greatly outnumbered, and the artillery had to be pushed forward to save the infantry, says, in a letter to Colonel Kriebel, published in his work, the "Matériel of German Field Artillery:" "Although I have learned to know and to prize the inestimable value of my splendid artillery as a powerful and never-failing support against a far superior and brave enemy—especially during the final difficult stages of the French war, when our infantry had become numerically so weakened—yet I all the more positively declare that it is absolutely unjustifiable to incur the danger, even with the object of producing decisive results, of pushing the artillery forward until within the effective infantry fire of the enemy, and even up to the fighting line of the infantry. In my opinion the present power of firearms of both descriptions should forbid such a measure, however much an occasional instance of success with its concomitant brilliancy may plead for so daring an act, which must indeed stir the heart of every soldier." That appears to me to be common sense. If the artillery fire is effective at 1,500 yards, and the infantry at, say, 500, why should the artillery incur the extra danger of getting the infantry fire by moving up to 500 yards? This Colonel Strangways has already pointed out.

Lieutenant-Colonel MAURICE, R.A.: One necessarily restricts one's self in these discussions to speaking on those points of the lecture with which one differs, and there is no time to say how very much there is in the lecture with which we must all thoroughly agree. I am afraid I shall serve to illustrate the confusion which

Colonel Hale speaks of, by saying that my first point will be one in which I differ, both from Colonel Hale and Colonel Brackenbury. In the first place it appears to me the form of the lecture, much more than the intention of the lecturer, has tended to give an excessive importance to what seems to me almost an incident in the change which has taken place in tactics rather than to that which appears to me the essence and substance of it. The essence and substance of the change which is taking place is not that we have taken up a skirmishing form of fighting in place of masses and line, but in those points on which Colonel Brackenbury has so well touched at the end of his lecture, which I should express by saying that whereas under the old condition of fighting the General in command had to handle a machine, now he has to lead and guide a body which has become infused with a spirit and a mind of its own; and that the whole change which has taken place in tactics is that you have to consider all the facts which are connected with the movement of a body so animated with a spirit and a mind of its own, instead of merely having to regulate the movements of a machine. The old condition of things cannot be better expressed than in the words, "It is forbidden to the soldiers of Prussia to think." It was a very noble phrase; it meant the absolute self-abnegation of the individual in order to preserve unity; but it involved the assumption that thought was necessarily insubordinate and hostile to discipline. It appears to me the essence of our present condition of fighting is that we are endeavouring to develop to the utmost possible extent individual thought in order that it may contribute to unity and subordination; and that, as it seems to me, is the whole point on which the answer to Colonel Hale's complaints against the present condition of things turns. It was the easiest thing in the world to get exact regulations for the movements of an army in the field as long as the word of command which the General had to give was, for instance, that the line was to wheel a certain number of paces. That specific order so given meant that certain specific words of command were to be issued to every section throughout his army. The division was to conform by exact movement, and every fraction throughout was similarly to conform by prescribed movement. In changing to a body which moves under quite different conditions, you must develop quite a different mode of action, and one for which it is impossible to lay down exact rules. What we want is that every individual throughout should thoroughly observe the spirit, knowledge, and discipline connected with the new form of fighting, should thoroughly understand the power of the three arms, the effect of fire of the artillery and infantry, and the use of cavalry. There should be a most thorough knowledge also of the influence which different classes of ground will exercise upon each of the arms, the most thorough study of the characteristics of men, and the mode in which men act under different conditions. Therefore, I think that the whole field of tactics is enormously enlarged. Drill is no longer the one mode of tactics. All this is included under the term "organization," and becomes a means of tactical movement. That is to say, everything which tends to develop unity with the perfect development of the power of each individual link throughout the whole body tends thereby to facilitate movement in the presence of the enemy, and enables it to take place with that freedom and perfection which is the essence of good tactics. Therefore, also, I venture to dispute the passage in which Colonel Brackenbury says, in speaking of the mode in which the advance of the second line is to take "place": "How is this to be done? The fact is that there are probably a thousand books and pamphlets on this subject. Some writers say that the second line must, above all things, avoid moving straight on the first, and should therefore come up on the wings. Others say that it should march over the first line under cover of the smoke produced by the latter. I take it, gentlemen, that when your time comes for this manœuvre you will not stop very long to weigh the various tactical forms. The longer you wait the more your men will suffer, and the more will their nervous strength be uselessly expended." I cannot help thinking that that is very liable to be misunderstood. I am sure Colonel Brackenbury does not mean it, but it is liable to be misunderstood to mean that the less you study your profession beforehand, the more rapidly and the more readily you will go forward in action. I am perfectly satisfied that what he meant was exactly the reverse. For my own part I venture to say that there is a danger of an exactly opposite kind for men who have studied their profession very thoroughly before-

hand when they find themselves in action; for some experience that might be cited tends, I think, to show that a man who has the ordinary energy of an English gentleman, who has become a theoretical student, just because he has a certain confidence in his own handling of troops, and does know how certain things will affect both the spirits of the men and their practical action in the field, has a little too much tendency to exaggerate the power which small numbers have, and therefore to push forward, where a man who had not the same confidence that he has from previous thought and previous reading would be disposed to hesitate and delay; and that if there be a warning which any man who has very much devoted himself to the study of his profession ought to have, it is, before he goes into action, not to trust too much to his knowledge, and not to be too anxious to exercise the high spirit which he has, but to put on a check and to be cautious in the use of the knowledge he possesses. I do not believe for a moment that the tendency is the other way. I do not believe that previous work tends to make a man too hesitating; but that, on the contrary, the man who will hesitate is the man who has not thrashed out the question for himself beforehand. To illustrate my meaning as to the extended scope which must now be given to the term tactics, I believe that as it is necessary for us to consider everything that affects the spirits and minds of our men, the order which has recently been given entrusting the education of our regiments to the company Officers has and must have the best possible direct tactical effect, not because the company Officers will not make mistakes, but because they will make mistakes and will learn from their mistakes, and because not being able to have any exact rules laid down for them, the more they come practically into contact with their men, and are accustomed to be talking to them on matters of general practical work, the more surely will they find that they have met this difficulty of confusion and doubt and hesitation which Colonel Hale thinks is so liable to occur in our present condition of warfare. And, again, for the same reason, because it seems to me that, under the present condition of fighting, the nature of the spirit we develop in different arms is the most important matter which we have to consider, I venture to differ a little from Colonel Brackenbury about the mounted infantry. I agree cordially with him in not believing that the day of the cavalry charge is past, and also in his not recommending the creation of a bastard force. I believe that the mounted infantry ought to be the most perfect infantry you can possibly have, simply shipped on horseback or on any other mode of conveyance. I cannot bring myself to believe that you will not affect the spirit of your cavalry if you habitually train your cavalry men to fight on foot. I think that a body of the best infantry that can be had, who can just barely ride but who are marksmen,[1] will be almost certain to beat at dismounted work almost any cavalry to begin with; and also that the spirit of your cavalry will be affected by not accustoming them to feel that they are Centaurs, that their mode of fighting is on horseback, and that on horseback they are bound to win. I believe that the whole of the past history of war may be cited to prove that again and again, as weapons have improved there has been a tendency to take advantage of them for cavalry, and therefore to use them on foot; but that wherever a great cavalry leader has arisen he has swept all that away, and has kept cavalry for cavalry purposes only. I fully agree with Colonel Brackenbury that the *rôle* of the cavalry is by no means limited to cavalry charges, but I do not think you can train them at the same time to be good mounted infantry and to charge home well, though I by no means dispute the necessity for their exceptional use of firearms on foot. With regard to the Prussian use of dismounted cavalry during the Le Mans campaign, it seems to me pretty clear that the Prussians at that time had nothing to do but to sweep away the *débris* of the French Army, and

[1] During the second day's discussion I received a letter from Major Lawrence, who was for several years Musketry Instructor of the 5th Dragoon Guards, and during the late campaign commanded the mounted infantry at Tel-el-Kebir. He points out the immense difficulty of getting even a few marksmen in a cavalry regiment, with all the other work that has to be done. Now, all our mounted infantry in Egypt were marksmen, and to that fact we owe the immense service they did us.

that the Prussians fully understood that they were for a specific and all-important object spoiling their cavalry for the time being. There is one other point I wish to refer to, viz., with regard to the mixing up of companies. The mixture takes place not of companies merely, but practically of whatever may be the largest units that are engaged. In the Peninsular War, divisions used to get mixed. During the war of 1870 divisions used to get mixed—sometimes corps d'armée; and I hold in my hand a very interesting letter from Lieutenant-Colonel Gordon, Sir A. Alison's Brigade Major, which, after describing the incidents of the attack on Tel-el-Kebir, goes on, just after the beginning of the fight, "I have a perfect recollection of seeing Sir Archibald on foot inside, with his revolver in hand, leading a mixed lot of Camerons and Gordons." Then a little later he says, "I lost sight of Sir Archibald in the confusion, and attached myself to a mixed lot of Camerons and Gordons." Afterwards he says, "We were joined by some of the Black Watch;" and a little later on he speaks of a place where Sir Archibald Alison and Sir Edward Hamley had both joined him. "There were present about 300 or 400 men, mostly Camerons and Gordons, and a few of the Black Watch." Now this was quite the beginning of the thing, and you must accept it as the fact that you will have not companies merely mixed, but you must be prepared for the mixture of battalions and, if they be present in the same attack, of brigades and divisions. It is not sufficient to deal with the question as if it was one simply of companies. The company question is a *bagatelle* with regard to the mixture that will take place.[1]

Colonel Sir LUMLEY GRAHAM: I wish, my lord, to make a few remarks on three or four different points. First of all, I hope that Colonel Brackenbury will not think me impertinent if I defend one of his statements against gentlemen who have assailed him, for I am sure he is perfectly able to take care of himself. I allude first of all to the question of the mixture of companies. I have had for a long time a strong belief in the mistaken formation of our infantry in small companies. I have long thought that for many reasons, which there is not time to give here at this moment, it would be advisable to form our battalions into four companies instead of eight, and this not merely because the Germans do it, and because every other European army—every other civilized army has adopted the same system after having plenty of opportunity of thinking the matter out, and weighing the pros and cons—but because of the intrinsic merits of the system. One of the strongest reasons is, what has been so much remarked upon, both by the lecturer and by some of the speakers—the great importance of moral influence. Of course, it always was an important factor in war, but the importance of moral force in war has increased enormously. I am perfectly persuaded that that moral force which results from interdependence between Officers and men, the power which induces men to follow Officers almost blindfold wherever they lead, can only be produced by constant connection between the two—by the Officer becoming acquainted with his men, by the men becoming acquainted with their Officer, by the Officer always training the same men, and the men always working together. Of course we cannot expect to keep a company always in that condition, because we know there are a great many disturbing elements. The moment war breaks out there is a mobilization, and a quantity of new men are brought in. Colonel Hale referred to the great number of men brought into German regiments to make them up to the war strength, but he forgot to mention, at the same time, that in the German Army the whole of the men who came back to those companies on mobilization, the greater part of them have

[1] It is obvious that the only point of quoting the attack on Tel-el-Kebir lay in the fact that the brigades marched in regular formation up to—in the case of the Highlanders—about 200 yards from the works. Lieutenant-Colonel Gordon's letter shows in how few minutes mixture takes place, even under these conditions, so much more favourable for avoiding it than an ordinary skirmishing attack. I give this note, because in answering me Colonel Brackenbury appeared to consider that the fact of the night march in some way militated against the inference I had drawn from it. It may be noticed that the *Brigades* had no chance of being mixed up at Tel-el-Kebir, because the attacks were separated by the whole space occupied by forty-two guns.

served in those companies before. They go back to their own family in fact, the family that they have merely left for a time. They come back into their old position. It is quite true that a great number of Officers are added when the army is mobilized, but I believe the case that Colonel Hale alluded to was exceptional. It is an evil which is deplored by German Officers, but it is an evil which I do not believe exists in most regiments to the great extent that Colonel Hale mentioned. Any one who studies the way in which the company system is worked out in the German Army must, I think, be struck by the immense influence which it has had on the success of that army, and I doubt not that it will have the same influence in future. I believe firmly that any army that goes like ours into action with small companies, which are liable to be reduced to nothing after a few minutes' exposure to fire, will be at a very great disadvantage to other armies organized in a different way. Now I turn to another subject on which Colonel Hale expressed a difference of opinion from the lecturer, and that is on the subject of long-range fire. Colonel Hale, I think, treated it as if the question was only one of long-range fire on the defensive. I think Colonel Brackenbury said, and everyone will allow, that long-range fire on the defensive is a most important factor. The ranges are marked out. You know your distance from the enemy; your men are firing coolly from under cover, and they can fire volleys which will produce great effect even at very long ranges. We know by experience the fearful effects of even *unaimed* fire at long ranges, if you can afford to expend a great amount of cartridges, the greater part of which will be wasted. Colonel Brackenbury, however, was more alluding to the effect of long-range fire on the part of the assailant; he talked about pelting a man on the top of St. Paul's. Now, as he says, he might go on pelting for everlasting, and not get the man down. No doubt what he must do is to go up to the enemy and turn him out of his position. Long-range fire will not be of much use for that; you must get to close quarters, and the great object of modern tactics is to get at your enemy as quickly as possible, and with as little loss to yourself as possible. The loss is a secondary matter; the first thing is to get at the enemy; therefore, I think, with Colonel Brackenbury, that long-range fire is a thing a great deal too much insisted upon in this country. I think we err in going to too great lengths in this respect. We depend too much on the experience of target practice in peace time, producing the wonderful results described by my friend Colonel Hale. But such results would not be obtained in war, particularly if you, the firer, were in the open, nor anything approaching them. Here is another reason against teaching troops to trust in long-range fire, not to mention the waste of ammunition, so difficult for an assailant to replace, and that is that you may injure the *morale* of your troops, if you accustom them to think that, by firing at 2,000 or 1,500 yards' distance, they can beat their enemy. If they get this idea into their heads, they will never care about getting to close quarters. We *must* brave the losses, and that is one thing in which I think there is danger in our peace manœuvres, unless we have umpires who will let the leaders of troops know that losses must be sustained, and will not put troops out of action, because they are losing some men. That is a dangerous idea to inculcate, for you must be prepared to lose men if you make an attack. Then there is another point, and that is the question of cavalry. I speak with all deference to the opinions of cavalry Officers, but I fully agree with Colonel Brackenbury that we have not got nearly enough cavalry; and rather than have special corps of mounted infantry, I would much prefer to strengthen our cavalry regiments, or to have more of them. Your cavalry ought to be able to do any of the work on foot that can be required of them; and I would ask how mounted infantry—organized in the way that we have hitherto organized them, by taking men from a number of different regiments—volunteers—picked men, excellent men, but still put together, as they are, on the spur of the moment, forming (so to say) a scratch pack; they do uncommonly well against Egyptians or Kaffirs, but if you take them to the Continent, and expect them to engage German dismounted cavalry, I think you will find your mistake. You must have a permanently organized body of men to meet such troops successfully. Therefore I think our mounted infantry—scratch packs—ought to be kept entirely for our little wars, and not for great European warfare; for that we ought to aim at having a much larger cavalry perfectly trained for fighting on foot, as well as on horseback, and I believe they are

capable of doing both equally well. Now about shields for artillery. It strikes me that if the lecturer used shields for his guns, he would very much diminish their mobility, he would at the same time make them a much better target for the enemy, and the horses above all, standing behind the guns, would hardly be covered by the shields. Colonel Brackenbury aims at bringing the artillery into the first line of battle. I dare say he is perfectly right, but he would lose very much mobility by carrying these shields, which would diminish his chance of getting his guns up to the front. The question of night attacks is one which we have all had on our minds very much, because we know that we have before us the leader of the most successful night attack which has lately taken place. But perhaps our gallant Chairman will give us the opportunity of hearing from him what his opinion is about night attacks, whether he thinks it is likely that they would be successfully made by an army of any size, by an army of ordinary European dimensions: not by surprise, of course, not falling upon an enemy badly guarded, but against an army like that of France, Russia, or Germany, properly covered with outposts properly on the look-out. I venture to think the difficulties of moving large bodies of men in the dark are so great, that even without meeting with any opposition from the enemy, in nine cases out of ten the combination would fail, that the troops would not find themselves in the right position at the right moment; the whole thing would cease to be a surprise, and the assailants would be exposed to all the difficulties of a counterstroke in the dark. If the enemy were properly provided with outposts, I cannot imagine any army approaching in the dark with success. I will close by saying how much I think we ought to thank Colonel Brackenbury for the conclusion of his lecture, in which he deprecated that practice which has grown up very much of late years in this country of crying down our soldiers. I think, as he said, that is not the way to raise the *morale* of an army. We say, "Give a dog a bad name, and you may as well hang him;" and that is very much the upshot of constantly calling out that our soldiers are not fit for this and not fit for that. I am sure our soldiers are fit for anything if they are properly trained, properly organized, and properly led.

On the motion of General Sir William Codrington, the debate was then adjourned to the Wednesday following.

Wednesday, May 9, 1883.

General Lord WOLSELEY, G.C.B., in the Chair.

Adjourned Discussion.

The Chairman: Ladies and gentlemen, at our last meeting Sir Lumley Graham remarked upon the statement made by Colonel Hale, in which he had referred to the condition of the German regiments at the beginning of the late war, pointing out how very few Officers there really were belonging to the regiments that actually went into the field. Sir Lumley Graham said he thought that was an exceptional case. Unfortunately Colonel Hale had in the meantime left the theatre; but he is now anxious, with your permission, to say a few words upon the subject.

Colonel Hale: I do not think, my lord, that the instance I adduced was at all an exceptional case. Referring to an article which has appeared in the 539th number of the "Revue Militaire de l'Étranger," I find the number of Captains who led their companies into the field in the German service, and the average is only 7·8 out of 37 regiments. The total strength of the regimental Officers is 69, and the average of the number of Officers belonging to the regiments who were with their companies when they went into the field was only 38·4. I have put up a diagram showing how the regiments took the field on the 7th August, 1870.

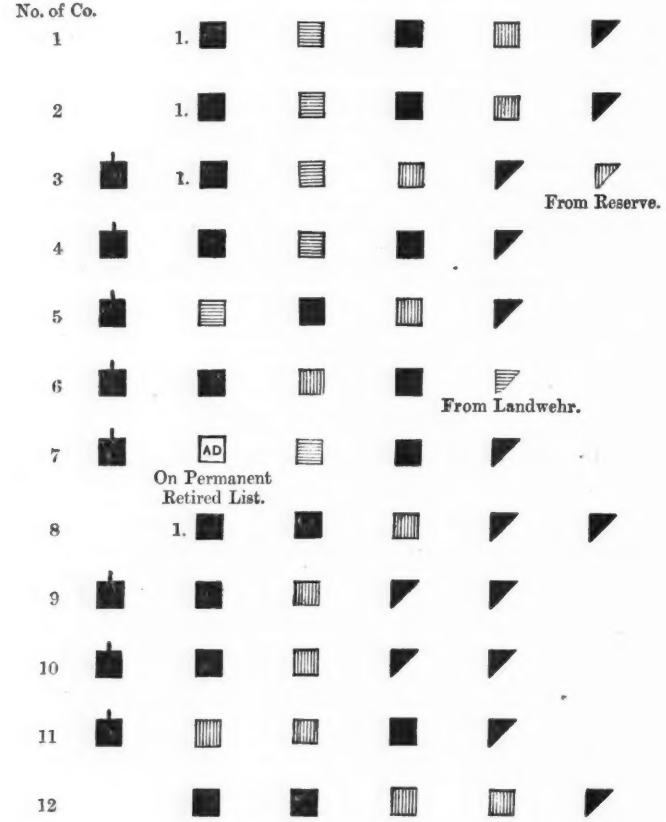
The 27th Regiment on entering France, 7th August, 1870.

Captains, 8.

Subalterns belonging to regiment at mobilization, 18 (5 First, 13 Second) Lieutenants.

Black, Blue, or Red. } N. C. O.'s, Portépée-Fähnrich, &c., doing Officers' duty, 16.

Subalterns from Landwehr, 6. Subalterns from Reserve, 12.



The black marks with points at the top show the eight Captains who led their companies into the field. That is above the average. The plain black marks, eighteen in number, show the only subalterns who were left with the regiment when it took the field. They made up the rest of the subalterns by drawing upon the landwehr for six subaltern Officers, and on the reserve for twelve Officers. They pulled out one poor old gentleman who is shown by no colour at all. He was permanently retired, but he became senior subaltern of the company, and then they got six Sub-Lieutenants and twelve non-commissioned officers to fill up the remaining places. I do not think that my statement altogether applied to an exceptional case.

Lieutenant-General Lord CHELMSFORD, G.C.B.: My lord, ladies, and gentlemen, the subject-matters for discussion which have been placed in my hand, I believe drawn out by the lecturer, in order to facilitate discussion, are so numerous, and embrace so large a field, that it would be utterly impossible for anyone, with the limited space at his disposal, to do justice to them. I therefore do not propose to make more than a passing allusion to cavalry and artillery, but shall confine myself to the arm I have had most to do with—the infantry. With regard to the cavalry, I endorse what the lecturer has said regarding the necessity for its being thoroughly practised to act on foot. I am sure that every cavalry Officer desires that his arm should be as thoroughly independent as possible when it takes the field, and the only way in which they can be so is by their men being instructed to act efficiently on foot when necessity requires it. I do not consider that it would be advisable to introduce mounted infantry into our service for European warfare, but I advocate distinctly keeping up a small nucleus in England, for any native wars in which we may be engaged, where cavalry cannot be conveniently employed. With regard to artillery, the lecturer naturally, belonging to that arm, has tried to prove that it is not only of the very highest importance, but of the greatest importance among the three arms. I cannot, as an infantry Officer, quite agree to that, and I confess to having been somewhat astonished to hear that he attributes the winning of the battles of Alma and Inkermann to the independent use of artillery. I certainly thought the infantry had won both actions. With regard to Vionville, which the lecturer quotes as a distinct action in which artillery won the battle, I am quite sure every artilleryman must be proud of the manner in which his arm was worked on that day. There is no doubt that the Germans handled that arm with remarkable boldness, and towards a definite object, viz., to prevent the French retiring across the Meuse on Verdun. But at the same time I do not think the German artillery can be fairly said to have won that battle. I think it was lost by the inferior tactics of the French General, who, instead of boldly making use of the superior force which he had at his disposal, allowed himself to be cowed by the German guns, which, if he had used his infantry properly, could not have stood their ground. Anybody who studies the German map of the battle, as it was between 4 or 5 o'clock p.m., will, I think, come to the same conclusion which I have drawn, that, instead of the Germans having won that day, it should have been a decisive victory for the French, had Bazaine only advanced his whole line boldly forward. With regard to the physical effect of artillery fire, it must be remembered that the principal error in artillery fire is always longitudinal and not lateral; therefore, so long as you keep your troops in line, either two deep or in open order formation, and so long as the support and reserves are not placed within such a distance from the extended companies as to catch the shots which miss them, the artillery will have a target to fire at which they will find difficult to hit. No doubt the French statistics are perfectly correct, and that they did suffer a loss of 25 per cent. from artillery fire during the Franco-German War; but it must be remembered that open order formations had not then been brought into force. I believe, therefore, that the French losses were occasioned more by faulty formation than by the accurate fire of the German artillery. I have not the time to enter into any discussion on the question with regard to the support of infantry by artillery at short ranges. I consider that artillery is best placed at about 1,500 yards from the enemy's position, where it should remain until masked by the infantry's advance. When that happens it must move forward. The further, however, it keeps from the effect of the enemy's fire, the better. With regard to the massing of guns, I

do not quite understand the lecturer. In the diagrams the guns are in divisional masses, and I am not certain whether he advocates that they shall be so massed, or that the whole corps of artillery shall be massed altogether.

Colonel BRACKENBURY: The larger the masses the better, but it must depend upon circumstances. It depends entirely upon the lie of the ground.

Lord CHELMSFORD: I cannot help thinking that the target which the corps artillery so massed would offer to the enemy, who would be able to concentrate his fire upon it, would occasion such loss as to neutralize the advantages claimed for such a formation. It would also give a splendid opening for long-range infantry fire, which I feel sure would be immediately taken advantage of by the infantry of the defence. And now with regard to the infantry. Many are inclined to think that drill can be separated from tactics; but I contend that the two are so inextricably mixed up together that you cannot tell where one begins and the other ends. The preliminary movements of the force made before its advance on the enemy's position are no doubt tactics; but when the infantry begins to advance, and comes under the enemy's fire, its movements may be *called* tactics, but they are really drill. The reason why our attack formation has failed in so many instances to be carried out satisfactorily, and why a doubt has arisen in the minds of so many Officers as to its merits, is because it has not been worked out as drill. Every commanding Officer practises the attack formation according to his own idea, and there is consequently no uniform system, such as there used to be under the old conditions, when we advanced in understood formation, laid down in the drill books. The method of attack should be formulated distinctly and clearly, and carried out uniformly, and until it is so, so long will it remain in the unsatisfactory condition in which it is at the present moment. I see no reason to alter the opinion at which I long ago arrived, that the present attack formation, *per se*, is as good as can possibly be provided: its whole success, however, depends upon the manner in which it is worked. The lecturer states that 2,500 yards may be considered as the distance when the two leading divisions would have to leave the road and to advance across country. Let us assume that the ground is perfectly open up to the enemy's position. The infantry must naturally get into some sort of battle order before it commences its advance to the attack, and we cannot do better than deploy into line, so that the General may understand exactly the front which the leading division will occupy during its advance. The lecturer states correctly that the object to be aimed at is to place the attacking force within charging distance of the enemy's position, as nearly as can be, in a two deep line. Therefore, unless you start by occupying the same amount of space at the beginning that you wish to do at the end, you cannot expect troops to advance in that order and with that steadiness which is so necessary to ensure success. It may be confidently laid down that during the first 1,500 yards of the advance on the enemy's position, the infantry will be under artillery fire alone. It must offer, during this portion of the advance, as inferior a target to the enemy's artillery as possible, and I consider that the present attack formation fulfils those conditions. The advanced companies need not be extended; and they and supporting companies can suit their formation to the ground which they have to pass over, and the reserve should certainly not be in column. These details may be left entirely to the discretion of the separate commanders, provided the direction of the advance be not lost, the object being to advance without firing within at least 1,000 yards of the enemy's position. Now when a long line, such as a Division, advances in attack formation upon an enemy's position, where is the opportunity for independent battalion action? Each battalion must move straight to its front, so that the whole line may reach the second stage of the attack (when it comes under infantry fire) in as good formation, and with as little delay as possible. It is a purely drill movement, where each unit has its allotted place. The lecturer says that the battalion commander must keep his four reserve companies in hand to strike when and where he chooses. I deny the "where" altogether. "When," of course, must be left to his discretion. He would wish naturally to keep them together as long as he can, so as to have them in hand, and not mix them up with the companies in the fighting line until the last moment. As regards the "where," however, he has only got the front of his battalion to manœuvre in, and therefore, if he moves his reserve companies outside that front, he at once interferes with the

battalions on his left and right. The whole secret of a successful advance to the attack consists in each battalion unit preserving its proper direction. When the attacking Division arrives at that point from the enemy's position, when it comes under its direct infantry fire, the conditions of the advance become changed, but the broad principles which guided its advance during the first stage still hold good. The attacking line may have to open fire, but it must be distinctly understood that this act should be deferred as long as possible—for two reasons, first, because firing will delay the advance; and secondly, because it will be very difficult to replenish expended ammunition in the advanced line. The advance by alternate units, either brigade, battalion, or company, covered by the fire of such portions of the line as may happen to be lying down, and assisted by the corps artillery, should enable the attacking Division to get within charging distance of the enemy's line. Should it not do so, there are only two alternative measures which can be adopted, viz., for the line to remain lying down where it has been checked until reinforced and equal to another effort, or for it to retire straight to the rear. There is no manœuvring possible under close infantry fire. The attacking force is committed from first to last to a movement to the front, or a movement to the rear. I can only make a few remarks upon a force acting on the defensive. The lecturer has alluded very briefly to this branch of tactics; but it is well that we should bear in mind that during the Peninsular War we won nearly all our battles by acting first on the defensive, and then making an offensive return; and I am inclined to think that the management of our troops in battle in the way most in accordance with the characteristics of the British soldier is good policy. I am quite aware that the Germans have come to the conclusion that the attack always has an advantage over the defence, but they are thinking of themselves, not others. Our troops have always shown a steadiness under fire of which we have been justly proud—a steadiness which no other nation in the world could rival—and we have always been able, at the critical moment, to make that offensive return which is, of course, the important point in a defensive fight. I believe, myself, that in the wars of the future, should we ever have to take the field against a European foe, the defensive-offensive action will be found still to carry with it the great merit that it was found to possess during the Peninsular War. With regard to the night march, and attack at dawn, which the lecturer considers will play a prominent part in future wars, one can clearly see how desirable it would be to devise some plan by which we should be able to get over, without much loss, the 2,500 yards which separates you from your enemy's position. I do not see, however, so far as modern European war is concerned, how that is to be done in the dark. The enemy's outposts will certainly be out so far as 2,500 yards in front of their position, and when they find out that you are advancing upon their position they will open fire. They would be reinforced, and a night attack would commence. Now I believe nothing could be more injurious to the interests of the attacking force than to find itself surprised instead of surprising: the whole of the troops composing that attack would become utterly demoralized. There is one other point to which I wish to allude which has special reference to a force acting on the defensive. It is curious that the lecturer should not have made any allusion to the employment of machine-guns. I know that machine-guns are not looked upon with much favour by the artillery, but I hope we shall soon see the day when machine-guns will be so improved and simplified that they can be handed over completely to the infantry. On the defensive, with our small Army, the employment of machine-guns would increase our power enormously. We could then place a small portion of the defending force in the front line, and keep the large mass of troops in hand ready for the counter-attack. The lecturer advocates the employment of magazine rifles, but I very much question whether their issue would be advisable. In conclusion, I would add how much gratified I was to hear the lecturer say at the end of his paper, that "later tactics demand not only high discipline and training, but discipline of a much higher kind." I am quite sure that that is the right spirit in which we must look at the question, and I trust that all those who have anything to say to the teaching of modern tactics will bear those words in mind.

Lieutenant-General Sir BEAUCHAMP WALKER, K.C.B.: My lord, ladies, and gentlemen, so many points which I have thought over since this lecture was delivered a few

days since, have been touched on by Lord Chelmsford, that I have really very little left to say. There are, however, one or two points on which, perhaps, I may be able to afford some information. I think that Colonel Brackenbury, by adverting in the terms he has done to the mixing of companies, may produce something like a scare in those who, until our formation is altered, will probably have to fight under our present organization. I do not think our present organization will lead to a bit more mixing of companies than was the case in the two German wars of which I was a spectator. The text on which Captain May hung his remarkable work, "Tactical Retrospect," which first set the question going, was the mixture of companies. As would naturally be supposed, the great authorities at Berlin, who leave no subject untouched, looked to this as one of the most important questions to be solved. During the war of 1870–71, I found the mixing of companies, of battalions, of regiments, and even of brigades, was as great an evil as it had been in the war of 1866. I do not really see how, even with the most careful drill—and nobody is more desirous of upholding careful instruction beforehand than I am—anything else is to be expected in the present day. As long as the loose system of fighting is adopted, you must have this inevitable confusion taking place. I have always believed that the reason why no advance was made after the battle of Königgrätz, was that there was such an inextricable confusion of the units of the army that it was impossible to advance without twelve hours to put the men back in their own companies, and the companies back in their own battalions. I therefore think I may, perhaps, not be out of place in giving a slight warning to those who have not equally considered the subject, that this mixing of companies is an evil which has not yet been avoided in the most drilled and effective army of the present day, and that we need not be frightened by a scare of that description. There is another point on which I am anxious to say a few words, because I think Colonel Brackenbury has been a little misunderstood by those who listened to him last Friday, and that is where he speaks of the "1,000 books and pamphlets." I do not know whether I have entirely grasped his idea, which is that everything must be left to the inspiration of heaven-born Generals. Well and good, you get a heaven-born General once in fifty years; but I do not think you will have heaven-born subalterns, and Captains, and Majors, and Lieutenant-Colonels, in such a vast number that you can trust to any inspiration on the field of battle, leaving a man to do the right thing at the right moment, unless his mind has been thoroughly indoctrinated by it before. Now I hope you will acquit me of egotism if I give you an idea from my own experience. I went late in life into the cavalry, and I believe in the three years of my first command of a squadron, I was able to handle that squadron as well as most men; but how was that? Because I so thoroughly indoctrinated my mind with every possible position in which that squadron could be placed that I had nothing to think of when the time came. When an order was given, I knew what was to follow; and that, I believe, is the true way of drilling up to tactics. Colonel Brackenbury, of course, will have the opportunity of telling us exactly what the allusion to the "1,000 books" meant. I can only say that I have derived the foundation for the opinions I have formed by reading nearly every book that I could lay my hands on, in which everyone who takes the trouble to elucidate so interesting a subject as this has published his ideas; and it is after comparing the different systems that one at last comes to a conclusion as to what is the right thing to do in the right place. But you must have instilled into your mind a positive knowledge of what can be done with the unit or units which are under your command; so that you will not have to deliberate when you come into the difficulty of a great general action, but you know at once, "This must be met by that which I have thought out, and which I have satisfied my own mind is the right thing to meet it." I should much like to have said something about cavalry, but there is really no time; I therefore turn to the closing subjects. I do not think night marches and surprises, notwithstanding the great and almost unequalled success which attended the last, will lead to their being applied in the future one bit more or one bit less than they have always been applied. As Colonel Brackenbury has alluded to Tel-el-Kebir, and as my old friend and comrade, Lord Wolseley, will be perfectly certain that I do not intend to pour the only English sauce, namely, melted butter, on his head, I may say that it was the type of a

night march and a surprise, admirably thought out (as I have reason to know from some of those who first returned home), most lucidly explained to all who had to carry out his views on the previous day, perfectly carried out by the troops under his command, and supplemented by what so seldom takes place, the pushing forward of cavalry to reap the fruits of your victory. But I do not think the example of Tel-el-Kebir will lead to the use of night marches and surprises one bit more or one bit less than has always been the case. It is an operation which can only be carried out under peculiar circumstances, the value of which must be carefully weighed before the great risk is encountered. The first one of which we hear was the geese of the Capitol, of which there was a picture in the Exhibition last year. Quebec was a night march and surprise; Inkermann was a night march, and Inkermann is a good example that should be studied by everybody who endeavours to carry out a night march. If the two columns had not—perhaps from some misconception of orders, from the darkness of the night, and want of knowledge of the ground—crossed their heads, I do not think we should have turned them off the field at 2 o'clock in the day. Königgrätz was a night march, but not a surprise, because the Austrians had good outposts. Sedan was a night march, and was very nearly ending on the extreme right of the French position in a very different result from what was expected. So thick a fog fell, that the troops, which we knew had marched at the very earliest hour of the morning, never came under fire until 11 o'clock in the day. I started at 3.30, and with the staff of the Crown Prince we were at the *rendezvous* at 6 o'clock in the morning; and we waited there until 11 o'clock before the two corps that marched round the bend of the river fired a single shot. The most successful night march and surprise as a picture of war was, perhaps, that which took place in 1811, when General Hill, with two brigades of infantry, two regiments of cavalry, and some guns, surprised Girard at Arroyo des Molinos. Hill marched at 2 o'clock in the morning. He had only one league to march, and he never got there until between half-past 6 and 7. It was a wet, stormy night; the French had neither outposts nor patrols, and the surprise was complete. With one brigade he marched down the main street, the pipes playing "Hey, Johnny Cope, are ye waking noo?" while the other brigade marched to the rear of the village, and they simply bagged the whole lot. Mounted infantry will, I hope, never be introduced into the English Service as an established force, organized and kept up at great expense in time of peace to do what, I say, the cavalry ought to do, and are able to do in war. The reason why we use mounted infantry is that nearly all our operations take place with the sea for a base; and instead of, as in land warfare, the cavalry forming the advance of the army, the cavalry do not arrive until the greater part of the force has been landed. If the cavalry are pushed forward in front of the army, I see no reason why they should not undertake the whole duties which are now performed by mounted infantry. I cannot believe that the use of a good firearm, and the power of acting on foot when required, will in any degree deteriorate from the value of good cavalry. The Germans have organized the whole of their cavalry with firearms. They have not gone to the extreme that we have of giving a carbine to every lancer, because they only arm a certain portion of each squadron with carbines, but the whole of the remaining cavalry is armed with carbines except the cuirassiers. We are the only people who give carbines to our cuirassiers, it being well known that a man with a cuirass cannot put a carbine to his shoulder. I do not think it was ever intended that cavalry should do habitual duty as infantry on foot. I think it is intended that cavalry, armed with a thoroughly good and reliable carbine, shall, when pushed forward in advance or to the rear of the enemy, be able to hold any post of which they have taken possession—a bridge, for instance—until such time as will enable the infantry to come up; but I do not think anybody will consider that cavalry are intended to act as infantry in the line of battle. The last point to which I shall advert is the responsibility of junior Officers. It is a most undoubted fact, but I think the responsibility goes a great deal higher; I think great responsibility is thrown on the junior Officer by the great advantages that may be gained under the present style of fighting; but a far higher responsibility is thrown upon the senior Officers, and until you have senior regimental Officers who are thoroughly able to instruct their junior Officers, the right nail has never been hit on the head. Now, I

never lose an opportunity, when I speak in this theatre, of giving my experience as to what the junior Officers of the British Army are at present. I have had now for five years to perform the duties of the most distasteful office in the British Army, that of making gentlemen who have not studied their profession study it, and give proofs that they have done so. And I should be doing very great injustice to the juniors of the British Army, if I did not say on every opportunity that occurs to me, what my experience has been. I said not very long ago in this theatre that there are men who will not learn anything, grumblers who will not learn anything that they are not obliged to do; but the general feeling of the young Officers of the army, and of men in junior ranks who are no longer young, and to whom, therefore, this infliction has been still more distasteful, has been most admirable. This infliction has been met with perfect cheerfulness, and the results have been excellent; and I can only say that in several instances gentlemen who had come to me, and had asked to be excused from going through this test, on the plea that they had learned nothing during their previous service, and that it was very hard, therefore, for them to go to school in their old age, have come to me afterwards and said, "Well, we thought you very hard, and you always are; but we thank you now for having enforced that which has given us, for the first time, a real interest in our profession." If that is the spirit of the young Officers of the British Army, and I unhesitatingly say that it is the spirit of the great bulk of them, I do not think it matters much what changes are imposed upon them, what type of attack they have to adopt, what form of formation in the field: the result will be as ever, they will come up cheerfully to what is required of them, and will show that the future has only looked to the past for an example.

Major PRATT, R.A.: I shall confine myself strictly to two points. Firstly, the lecturer alluded to the power of artillery. Of course we all admit that artillery *matériel* is increasing enormously in power; but I do not think we have sufficiently recognized the amount to which the *personnel* of the artillery has been increased on the Continent. In the most recent additions to their army the Germans, while increasing their infantry 7 per cent., augmented their artillery by 13½ per cent. Without going into the number of guns per thousand men, which is a most misleading calculation, I believe it is a fact that the German Army Corps of 1870 and 1883 virtually consist of the same number of men, and we know they have practically added two batteries to each Army Corps. With regard to how we should get this power for our own service, of course it is rather a difficult thing to decide. Our Army Corps and Divisions exist to a great extent for artillery organization upon paper, but I think for home Service we might do some good in getting our batteries at the big stations—where it is practicable to work together as divisions of four batteries—putting them under the command of one Officer for drill and organization purposes. Before leaving this question, I venture to point out one way in which I believe the power of artillery can be very much enlarged. For these many expeditions which we undertake in all parts of the world, I plead for one unit of our Army which has hitherto been much neglected. It only exists in two or three small stations in India, and it has probably done more hard work than almost any other unit in the Army. If you refer to the war of 1876, I think one of the most interesting lessons to be learnt is the very striking way in which mountain guns did their work, not only in mountain warfare, but actually working as field guns; and I venture to point out a fact which may not be known to everybody here, that the mountain gun of the present and especially the mountain gun of the future, will be very different from that of the past, and that it is essentially a field gun carried on the back of mules. We make our present guns in two pieces. There is one being now manufactured of steel which is capable of being carried by mule transport, and will fire a 10-lb. shell with a high velocity. I conceive that the use of mountain artillery of this type would do away with the chief *impedimenta* of artillery, which is so often found in the way in taking it into semi-civilized countries. Colonel Brackenbury pushes forward his artillery to a third position, and says in his notes, "Pray let us try to get rid of that idea, retrograde, hampering, and quite contrary to experience, that artillery cannot advance to within short range, say 800 to 600 yards, of an enemy's infantry." Now, sir, I should like to refer to what was said by two Officers at the last meeting. In the first place, I do not think we quite

understand what Colonel Strangways' views were. He wanted, apparently, to keep back the artillery to some 1,500 yards from the position, but he further added that he could conceive we could have an attack of infantry with the artillery, under normal conditions, firing over their heads. I believed that idea was exploded, but think it really is a question for the infantry to decide. If we are going to carry out an attack with artillery firing over the heads of the infantry, we must practise the manœuvre in peace time. With regard to ranges of from 600 to 800 yards, I am afraid I must differ from Colonel Hale. I have been for the last six years endeavouring to drive into the heads of cadets some of the elements of tactics under rather discouraging circumstances; but if we are to take Colonel Hale's ideas, that the whole tactical world is in a state of chaos, how are we to deal with tactical instruction? We had better abolish military education altogether. How are we to recommend the study of tactical books, or lecture on the experience of the past? I come here as a humble disciple of Colonel Hale, who has had so much to do with introducing the study of tactics at the Staff College, and I ask him for some tactical food. What does he give? A pennyworth of principle, and he asks us to wash it down with an intolerable amount of sack which he calls "circumstances." I venture to think we can get, by looking abroad, some little crumbs of comfort. I would appeal to those Officers present who are so well up in foreign military literature as to what they are doing on the Continent? We find a certain amount of standard books which come out constantly in new editions, and are brought up to date in accordance with the experience of modern wars. It is upon them that the different instructors at the military schools base their lectures. Then, going a little further, we want some stronger meat. We get it from Officers of experience in war, such as General Verdy du Vernois, Colonel von Shell, General Berthaut, General Dragomirow, and several others. The whole of those authors are not in a state of chaos, and they inculcate most distinctly what I call the close order of fighting which Colonel Brackenbury has so ably described. With regard to what I may call the third and rising school, of which Colonel Hale is so admirable an exponent, I think that we do not quite realize about this long-range fire. Immediately after the war of 1870 all nations tried to reorganize their armament; and if you take the different dates at which the new weapons were brought forward, the different rifles, and the various artillery equipments, you will find you can fix upon the year 1873, when you had virtually a new equipment both of artillery and infantry, which differs very little from the modern small-bore rifle and the future gun as we intend to have it. From 1874 until 1883 there has been a constant succession of these experiments of long-range fire. It is no new thing, but occasionally when other matters are not on the *tapis* there is a tendency to get hold of these enticing principles of long-range fire. I believe what I may call the tactical constitution is firmly established. We have got good text books; we have got pretty nearly all the headquarter staff of every Continental nation of Europe to agree in principle, and against them we have theories based on a certain amount of detail as to the experiments of long-range fire. The Germans, who have taken up the thing so strongly themselves, ignore the results of it, in so far that they say the best way to deal with long-range fire is to get to close quarters.[1]

Colonel GONNE, late 17th Lancers: My lord, as a cavalry man, it may seem rather extraordinary that the few remarks I am about to offer touch the infantry and artillery, and I shall confine myself to the question of tactics. We were all rather staggered to be told by our professors that tactics were without laws, and were hardly guided by principles. Now I am not sufficiently John Bull to raise my voice against copying that essentially warlike nation, the Germans, who really have the cream of the talent

[1] No one denies that long-range fire will be valuable in exceptional cases, and, notably, when acting on the defensive, or that the preparation of an attack by fire may have to be more carefully worked out. In common with many others, I do not, however, believe that the range experiments at Spandau, Steinfeld, St. Maurice, &c., combined with questionable deductions from the war of 1877, are sufficient to cause any material alteration in the principles upon which the modern attack formations are based.

of the nation in their army, and I differ in opinion from those who assert that the German "order of battle" in the present day will resemble that which it was in either the war of 1866, or the late French War. What have the Germans lately done? The company column holds exactly the same name and esteem in Germany as before, but they have discovered that it is positively necessary to curb and guide the private soldiers. They do this in every particular, but more especially as regards fire discipline. The whole of the training of the German Army turns upon not letting the men out of control of those who are immediately in charge of them. Now, as regards firing, I have been able at last to ensure an absence of useless fire by throwing the responsibility of the ranges on the Officer. Volleys are fired, and the spot where the bullets touch is watched by the Officer or non-commissioned officer who gives the command, and then the range is declared to the men by an order as to placing the sight. They fire volleys only for long ranges. This may be called unaimed fire, but you will find in every peace exercise, to show that it is their habit in war, a certain number of volleys are fired at the beginning of an action. The quick fire is only allowed when the men are placed out of hand, and are on the very eve of attack with the bayonet. The repeater rifle, which they have been practising with, is intended to be used merely for this late stage in the battle. If they adopt a repeating weapon, it will be one that they can fire in the ordinary way, until the order for quick fire is given. Every Continental nation copies the Germans, and if you happen to be attached to the Austrian or Russian armies, you will always know every change that takes place in the German Army, by watching the autumn manœuvres. Such was the case in Russia last year as regards large cavalry manœuvres. The Russians heard that the Germans had carried out manœuvres with masses of cavalry, and they did the same thing in the Odessa district. I think we ought to learn something from the tactics of the British Army in the last campaign, and here I come to the question of the efficacy of field artillery fire, as we have seen it up to the present date. When the British Army moved to Ismailia, I think I am right in saying the first troops to disembark were cavalry, and the cavalry were the antennæ of that red insect which afterwards ate up Tel-el-Kebir—an insect now of a chameleon nature, I regret to say. The cavalry, so to say, screened the disembarkation of the infantry, and were exposed to a very heavy fire from the Egyptian artillery. Although the Egyptian guns may have been faulty, they fired the old percussion shell, and I am told that they were admirably served. The shells plumped in among the troops, but did no harm, for the simple reason that the fuze was not sufficiently sensitive, and the shell buried itself, and made no dangerous crater. Another extraordinary thing happened at this moment. You may say the Egyptians would have had the pluck to attack if it had not been for the accurate rifle-fire of some mounted infantry. I am told by those who were present that when the Egyptians showed any sign of coming on to attack the screen, which was not desirable at that special moment, because the infantry, though on the march, were not actually on the battle-field.—I am told the men who were most prominent were seen to throw up their arms in death agony; the fire had been so good that individuals were shot. That perfection of aim you will never get from dismounted cavalry—so here I recognize a distinction between the dragoon of Russia fighting on horseback or on foot, and the mounted infantry who proved so useful first of all in the neighbourhood of Alexandria, and who actually prevented the Egyptians from making an advance when the disembarkation was scarce complete at Ismailia. I assert that although the guns were well served and pointed, they killed nobody, and that is not the only instance. If you really search for examples, it is safe to assert that the guns around Plevna did not, except by forming lines of circumvallation, precipitate the fall of Plevna by one hour; and you may believe that the guns of the British force landed at Ismailia had nothing whatever to say to the fall of Tel-el-Kebir. I am quite aware that now we are about to introduce a new gun and a new shell—that means a perfection of the shrapnel shell, with a good time fuze. As yet we have not had it. If we were going to trust the percussion shell, I should say the artillery has been, and is very little more than a moral force in the field, and a very strong moral force, but not a physical danger. It will be otherwise, I have no doubt, with the improved shrapnel, but that remains to be proved hereafter.

Major-General J. H. DUNNE: When I sent in my name to make a few observations, it was because very little was said in last week's discussion about infantry; but after all that has since been said to-day, by two such able exponents on the subject as Lord Chelmsford and Sir Beauchamp Walker, my few remarks are hardly justified, except perhaps from the circumstance of my having had some fourteen years' experience in commanding a regiment, and some four years in commanding a brigade depôt. The lecturer, alluding to the attack of infantry, and some of the speakers who followed him, expressed grave doubts as to our attack being the best, owing to the mixing up of the men, and the loss of that *esprit de compagnie* which the lecturer seems to think is almost as valuable as *esprit de corps*. Doubtless in foreign armies, where there are large companies of 250 men, a great amount of that mixing up is to a certain extent obviated. But Sir Beauchamp Walker considers this of very little consequence! In my unfortunate country, where I am afraid an army of occupation must exist for many years to come, there are a vast number of small barracks, in which it would be quite impossible for anything but the old-fashioned companies to be posted. When in Ireland some years ago, my own regiment had seven companies on detachment. Each of these companies was a separate unit in itself, and there was that company emulation to which the lecturer alluded, and any Captain worth his salt made it a point of honour to bring back his company to head-quarters in as good condition as adverse circumstances would permit. Therefore, as long as our army has to be scattered and broken up in detachments all over the country, it would seem that it would be better for us to continue the company as we have it at present, unless it can possibly be managed that subdivisions of large companies should be given the same staff of Officers permanently attached to them as our present companies have. Between 1867 and 1877, there were, I think, at least four or five different systems of drill attack, more or less authorized, amongst infantry. No sooner had the Commanding Officer drummed the whole of one drill of attack into his men, than out came another, and the difficulty was to unlearn the old drill and begin afresh, and, moreover, every battalion was liable to be experimented upon by every General under whose command it was, and all his theories had to be worked out. Since 1877 there has happily been no change in the drill of attack. If there is now to be another change, let the very best head-pieces of our army be got together to devise a drill of attack which may have something of finality in it, for as our army is now constituted, it is impossible to be continually teaching the men different drills of attack. The principles of that drill must be thoroughly learnt by all, and we have far less time now to teach our men than formerly. As has been said, this drill requires more training, more individual intelligence and self-reliance than the old humdrum battalion drill did, and much more will be required of young Officers in the future than has been the case in the past. There are no doubt a number of high spirits, young Officers, who would be as good as ever in a campaign, but who from various causes will hardly devote the time that is now required to impart instruction in drill, musketry, and everything else to their men; and if the work is so irksome to some of this class, that they leave the army, surely there ought to be more professional advantages held out to those who remain, and give the best years of their life to the profession, toiling daily in instructing fresh levies of troops; surely they should not so labour with the risk of finding themselves—through the accidents of slow promotion—relegated to idleness on a pittance of a pension at the age of forty! It has always been the great grievance of Commanding Officers, especially in large garrisons, that they never could get a drill with the whole of their men, an enormous number being always taken away for standing fatigue duties, for Staff employ, and as permanent orderlies to all sorts of officials. As long as the old system lasted, this did not really so much matter, for a Commanding Officer took care to give these "billets" to old soldiers so thoroughly imbued with drill that they were always ready to go through it without mistakes when pulled out for a General's inspection, or some very special field day. But with our new system of short service this cannot be the case, therefore let it be so arranged that Commanding Officers should either monthly or quarterly have their *whole* battalion handed over to them for a few days' instruction, and on those days, let not a single man out of hospital be absent on any pretence whatever. It is only then that a Commanding

Officer can be fairly held responsible that his men are "able to go anywhere, and do anything." If this is done, Generals, with the present stamp of infantry soldiers, will be enabled to develop in action this the most important of the three arms, as well in the future as ever has been done in the past.

Colonel BRACKENBURY, in reply, said: I only wish to say a few words, and there is the less reason for my saying much, because nearly every statement that has been made by one speaker has been answered by another, so that I have very little trouble indeed so far as argument is concerned. There are, however, two or three points which must be gone over a little again, because they may be explained to a certain extent. With regard to long-range fire, no one, I believe, would say for an instant that it is of no use at all; such an exaggeration would be foolish. There are conditions under which long-range fire may, undoubtedly, be used with advantage, but it is not the long-range fire which is going to win the battle. That is the point. At last you must come to the closing of infantry, and then there is no place for long-range fire. Occasions such as the defence of works, when there has been plenty of time to take ranges, and the ground is perfectly plain, are suitable for long-range fire, and others of a kindred nature may present themselves. There was sent to me this morning an excellent article from the "Manchester Guardian," on the lecture that I had the honour of delivering, and it quotes what I confess I had not noticed—the last official utterance on long-range fire. It is by a French Committee, which has just brought out a new book for the instruction of the Army, and in quoting it we should remember that the Latin races, the French and the Italians, are more inclined towards early and long-range fire than the northern nations. Here is the passage quoted by the "Manchester Guardian":—"To fire at a distant object may result in shaking a body of the enemy, in delaying its entry into action, and thus increasing our chances of subsequent success. It may render difficult the occupation of an important point, such as a bridge, a place where four roads meet, or the issue from a defile which the enemy must pass, but it rarely produces decisive effects. It is, above all, at short ranges that a great number of cartridges and rifles is needed, in order to be superior at the decisive moment, when firing produces its surest and most powerful effect." In other words, infantry may do to a slight extent at their long range what is the duty and the easy work of artillery at that range, but let them beware of wasting ammunition. With regard to the mixing of companies, Colonel Maurice quoted the battle of Tel-el-Kebir, where, undoubtedly, companies were mixed, as they were mixed, I suppose, in every charge which has ever taken place in the history of war. But what was that battle? There was no advance by daylight, against a force resisting our troops. It was exactly the opposite of the advance shown on these diagrams which you see before you. The advance was made by night, without opposition. The infantry arrived, without firing a shot, at the point to which it is wished that they should arrive, after all the trouble which has been taken during the long advance shown in the diagrams. Therefore, the action at Tel-el-Kebir does not the least in the world affect this question. In such charges, of course companies, battalions, and brigades, as Sir Beauchamp Walker has so rightly said, would probably be mixed up; but what we want to avoid is mixing them, if it can possibly be helped, in the long advance before the charge, so that we may bring at last into close contact with the enemy a force which shall be homogeneous, which shall be under the hand of its Officers, and ready, therefore, to be used in whatever way those Officers desire. Then we turn to the artillery. Now, unluckily, I am an artilleryman myself, and so handicapped in an argument. And worse still, my views on the subject are opposed, to a certain extent, by a brother artilleryman, Colonel Strangways. In arguing on this question I always find that writers and speakers compare artillery fire at 2,000 yards, or thereabouts, with infantry fire at 200 yards. Well, if you are going to talk about infantry fire at 200, or 400, or 1,000 yards, then put your artillery in the same place, and consider what the physical effect of the fire is. That will be a fair comparison. There were experiments made at Okehampton, some years ago, which would give you some idea what the physical effect would be, supposing, of course, that there were no infantry fire against the artillery. It so happened that a discussion was going on one day in the Intelligence Department between myself and one or two Officers on this very

subject. My views on artillery fire were questioned, especially that artillery fire is very much more deadly at close than at long ranges. I asked one of the Officers if he would make out a programme, and we would try and get it carried out at Okehampton. The consent of the War Office was obtained, and Colonel East went down to see that the test was a fair one. The result was this, that when firing at 1,500 yards, against a very large cavalry target, 11 per cent. of the men were damaged in one minute. At 1,000 yards, firing at a much smaller infantry target, 18 per cent. were put *hors de combat* in one minute. At 600 yards, 33 per cent.; at 400, 40 per cent.; at 300, 50 per cent.; and at 100 yards, 75 per cent. in one minute. Now, I do not say that this is what would occur in battle,—that is quite another consideration,—but it merely shows the proportional physical effects of artillery, going down from 1,500 yards to 100 yards. In all such experiments, whether with artillery or infantry fire, deductions must be made for the effect of the enemy's fire against the shooters. Then Colonel Strangways spoke of the necessity of preserving artillery for future fighting. Why on earth are we to preserve artillery more than cavalry or infantry? Why is artillery to say that it alone is not to face the danger which the other arms are to face? It so happens that the argument is rather the other way. Every cavalry man who is killed is gone with his horse and arms; every infantry man is gone with his rifle and bayonet; but every artilleryman who is killed is not gone with his gun: his gun stays there, and you have only to feed it, and feed in a very small proportion, with reserves, and you will probably not lose a single gun. It seems to me that artillery is better able to sacrifice itself, without losing its efficiency, than cavalry or infantry. Only one word with regard to shields. My proposal when first made differs from all former proposals, in that I do not wish to carry the shields on the guns, which would overweight the equipment, but to carry them separately, and I believe that in such a change will be found at last the key to a very difficult question, how artillery is to face infantry at close quarters. Experiments were made, at my suggestion, by Sir William Armstrong. It was found that very excellent shields could be made, and that one carriage per battery would carry sufficient to protect the whole six guns, or that they might be carried on two waggons, which would each have a limber of ammunition besides, so that it is not necessary to make a very great addition to the battery after all. With reference to a remark of Lord Chelmsford, I did not quote Alma and Inkermann as battles won by the action of the artillery, but merely as early instances of using English guns independently, and arguments against the idea that the independent action of artillery is useless. Then, as to mounted infantry. I believe that the average of the views expressed in this discussion has been rather in favour of dismounted cavalry. My own experience with regard to the question is perhaps unique for an Englishman. I was present at, I believe, almost the only really important actions of dismounted cavalry which have taken place in Europe in modern times; that is to say, during the first advance of the Russian cavalry over the Balkans under General Gourko. There were about 10,000 men altogether, a large proportion of them being cavalry. We penetrated from the Danube through the Balkans perfectly alone, as first a cavalry advance, then a flying column, and went right into the middle of the Turks. I saw the dismounted cavalry capture Tirnova, defended by 3,000 infantry and several guns. Again, they captured Kasanlyk acting on foot; and over and over again I saw excellent work done by dismounted cavalry. Afterwards, when it came to the great battles of Plevna, and so on, there was no place either for dismounted cavalry or mounted infantry, and therefore you cannot quote against them the fact that they did nothing. It is only in exceptional cases that they can be used, and the same remark applies to mounted infantry. Somebody said that the world had for a long time been committing the mistake of trying to make cavalry work on foot. That was not the mistake which has been made; the mistake has been causing cavalry to fire from horseback, a fault which occurred in the war of 1866, among the Prussian cavalry. The firing from horseback and retreating was very annoying to the Austrians, but it was not successful as a tactical manœuvre. And now for the general question of tactics. Drill is of course a part of tactics, and as Lord Chelmsford said, the whole success depends upon the manner in which drill is applied. Colonel Maurice, on the

other hand, has said that the principle to be considered, and it is a great principle, which he thinks that I have not sufficiently noticed, is, that an army is not a machine, as it used to be, and that there must be a great deal more left to individuals. I have already said much on this point, but it will not do to exaggerate the change. The truth seems to me to be between Colonel Maurice's view and that of Lord Chelmsford. No doubt an army is much less of a machine; you must trust a great deal more to junior Officers, and even to non-commissioned officers the leaders of very small forces, but I should be sorry to give up that steady training which alone can put men into the field with confidence in themselves and each other. When you first arrive on a field of battle with an enemy in front of you, that is not the time for you to begin to cudgel your brains with, "What shall I find in the last wars of Napoleon?" or "How was it the Prussians met a case very different to this in 1870?" No; you must have practised these things in time of peace, or you will never succeed in time of war. Men's brains do not work in the same cool way before an enemy that they do in the study. They need to have certain strict rules which would carry them as far as rules can go; but there comes a time when rules can carry them no further, when something is left to each of us, and we must strike out a line of our own. The line which we take will depend upon the accumulation of all the knowledge that we have in us, boiled down in our brain, and we may say also tinged by our own character. One man will be a little more cautious, another man a little more dashing, but each will have to bring out at last what he has learned. And, therefore, the more we have learned, the more we have turned it all over in our heads, the more we have made tactics a part of ourselves, the more readily shall we be able to act in war, when the time comes that each individual's own action is necessary. The tactical forms which are laid down are like the moves of the men in chess. We may make this move, or the other move, and we cannot make more than a certain kind of move with each piece; but we do not stop at learning the moves. How do you learn to be a good chess-player? By perpetual practice, and by studying the best games which have been played by other people. It is exactly the same in war. The whole of peace time we must be at it with companies, with battalions, with brigades, if we have the chance; but at any rate, wherever we are quartered, we should practise tactics with companies, and the smallest possible units. Colonel Hale quoted an article in the "Revue Militaire," which I know very well. Permit me to read a rough translation of the conclusion of that article. The writer says: "Beware of going too far, and despoiling attacks of their qualities, their governing virtues, energy and impetuosity. Beware of losing in the imbroglio of methods and expedients, suggested and legitimatized in a certain measure by the difficulty of approach, the mother idea which should inspire and inform every decisive action—the conviction, namely, that we are staking our all, and the resolution to carry through the business." In a later article, published on the 30th April, he says: "The essential in the attack is that everybody advances, and advances without ceasing." So he at least is on my side. To sum up, all the forms of tactics come to this at the last, that there you are in front of an enemy with troops which you, according to your good tactical arrangements, have brought up in the best possible manner, the least destroyed by the fire of the enemy. Then comes the moment when there is nothing on earth for you to do but to charge, to do the best you can, and that is clearly stated by this same French writer. He says you have to make a breach first of all, secondly to attack the breach, and thirdly to occupy the breach, and there is no more tactical formation to be laid down for that than there was ever in the days when Frederick's troops and the Russians closed and fought with bayonet and butt at Zorndorf. When all the tactical manœuvres are over, you come to courage, and the *morale* of Officers and men, and to that feeling of confidence which Officers and men must have in each other, or else you had better put your hands in your pockets and make peace.[1]

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[1] With the permission of the Council, I should like to add a few words on the question of machine-guns in the field. The subject escaped my attention, for the simple reason that on the Continent no nation believes in a future for this class of weapon, nor had I any idea that it could be so seriously regarded by English

The CHAIRMAN: Ladies and gentlemen: I am sure we have all listened with the very greatest possible pleasure and interest, and I may say advantage also, to the lecture we have heard, and to the interesting remarks that have been made upon it. I think every lover of his profession, every lover of the British Army, must be very glad indeed to listen to, or to read, discussions of this nature. Not only is the lecture itself very valuable, but I attach still greater importance to the discussion which takes place after it. It enables every Officer who has thought upon the various subjects touched upon in the lecture to give his views, and by communicating them to others, to make others think upon important subjects like that now under consideration. The subject referred to in this lecture is that, of all others, the most important for our Army and for all the armies in the world. I had hoped to have made some few remarks upon each of the several points touched upon by the lecturer, especially as my friend, Colonel Brackenbury, had supplied me with a list of the subjects which he thought it would be interesting and instructive to call your attention to. But were I to attempt to do this, my remarks would sound like pages extracted from Jomini, for Colonel Brackenbury's list embraces all the heads into which a writer on tactics would naturally divide his subject; in fact, it begins with the use of the three arms, and winds up with "responsibility." I have no intention of going over the whole of those subjects, especially as most of them have been discussed, and, as my friend the lecturer said just now, many of the propositions made by one speaker have been replied to and answered by others. But there are two or three points that I should like to refer to. There has been constant allusion in all that has been said on this subject to the connection between drill and tactics, and there is no doubt whatever that these two subjects are intimately connected. But although with regard to drill it is quite possible to publish a book of regulations, and to lay down very exactly what you should do under all circumstances in a barrack square, or even in the Long Valley at Aldershot in reference to the movements of a brigade or a division, yet it would be utterly impossible for the greatest tactician in the world to attempt to lay down didactically any positive rules with reference to tactics. Before I go any further, I think it is very necessary to tell you that the remarks I am making to you at the present moment, I make not as an official, not as one holding an official position in any way whatever, not as the Adjutant-General of the Army, but as General Wolseley, a comrade of yours, who wishes to tell you what his opinions are. Now, drill has two objects. First of all there is that object to which the lecturer has referred with very great emphasis—I mean "discipline." One of the great objects of drill, as I conceive drill to be, is discipline, for drill disciplines not only the body, but also the mind. The second object that drill aims at is, to enable you to carry out certain manœuvres; in other words, to get at an enemy with as little loss as possible, and as quickly as it is

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tacticians. If machine-guns could be transported without difficulty, put down exactly when and where they are wanted, and removed with certainty when no longer required, they would undoubtedly be of great value. But I fail to see how infantry are to move them over the rough ground traversed by foot soldiers; and it appears to me that such pieces would greatly hamper any battalions to which they were attached. And what would become of them in case of repulse? Like the battalion guns of Frederick's time, they would be forgotten in the hurry of retreat, and fall into the hands of the enemy. At short range they would be efficacious; but so is artillery, though it is extremely difficult to persuade Englishmen to believe this truth. At long ranges the difficulty of knowing whether the elevation is correct is greatly against them, and the mitrailleuses failed entirely in the Franco-German campaign for this reason, except when used in defensive positions, as at the battle of Gravelotte. Good shrapnel is more trustworthy, because its effect can be made certain by using compound fuses, that is with both time and percussion action. The addition of light shields to field artillery would, I think, give all the support to infantry that can be desired. The desire to add a new weapon upon wheels is surely an admission that infantry requires something more than its own fire at short range, and is accordingly welcome as a sign. Machine-guns might, however, form part of the army artillery reserve columns.—C. B. B.

possible to do so. This leads me to think of how drill is generally taught, and I cannot help thinking that nearly all the armies of the world, certainly our own, have always reversed the order in which drill should be really taught. We seem, before we begin to lay down rules with regard to drill, or to publish a drill-book, to have conceived for ourselves some floating and curious idea of what war should be, in fact, of what a battle ought to be. Our notions as to what a battle ought to be seem to have come down to us from pre-historic times almost. We then apparently set to work to create a system of drill to meet the circumstances and exigencies of this imaginary battle. My view of drill would be just to reverse that process. I would first of all read the books written by others who have great experience of what has taken place, and what does take place in every action. I would find out exactly what it is—what an action is, from the very first moment a shot is fired until the position on either side is stormed and taken. I would find that out: find out what the duties of a private soldier in action really are, and having thoroughly arrived at that conclusion, then work back from that to the goose step. You have to accept certain difficulties; work back from those difficulties, and try to take the sting out of the disorder which we know to be inevitable, and working back from it, deduce laws from it, and formulate your drill to suit them. Study how you should teach your men, and what you have to teach them; I maintain it is a very great mistake to over-do what you have to teach soldiers. In the present conditions of warfare we have a very great amount of teaching to instil into a soldier to make him a really valuable man in the field; but very often we seem to forget what it is indispensable we should know, and try to teach him complicated movements which are very pretty in Hyde Park, and amusing to the nursemaids there, but which are of very little use in war. I grant you that these intricate movements tend to discipline the soldier, but I maintain that as nowadays you have only a limited time to teach him in, you ought to devote it exclusively to instruction in useful things; and that in teaching him useful things, you will discipline his mind and body quite as well as if you taught him complicated manœuvres, which are very pretty to look at, but are utterly impracticable in the field. We all know that open order is essential, and we must recognize it as the formation of the future. I think we still cling a great deal too much to close formation. We have too much of the mechanical even in our field-days. There is too much of dressing upon points and going through the different phases of preliminary drill, which I think are useless, and not only useless, but dangerous. I think it is a very dangerous thing to tell a private soldier—who is not a highly-educated man—that when you take him out for a field-day you mean to give him an idea of what an action is like, that you are going to exercise him in a manœuvre that is a fair representation of war; when what you actually do is to drill him in a barrack-yard fashion, and during the course of the day's proceedings to make him do ridiculous things, such as dressing-up and dressing upon points: the result of such a system of instruction is, that when he finds himself actually under fire, and in a difficult position, his head being, perhaps, a little turned by the excitement of the moment, he discovers he is not called upon to do what he was taught in the sham-battle at Aldershot, and the result is a still greater confusion of mind, and a want of confidence in his Officers who had taught him so stupidly, and who by their method of instruction showed their ignorance of the realities of war. I think it is a very dangerous thing to teach a soldier in peace anything which he is not likely to practise during war. Of course you must naturally teach him a certain amount of simple drill to enable him to move with precision, but everything not practical in its objects should, to lead him up to that amount in these days of short service, be ruthlessly eliminated from our drill-books. There has been a great deal said about the mingling of companies, and I am very glad that Sir Beauchamp Walker has said what he has done on that subject. My little experience in war has certainly been mostly in wars with barbarous people, but it has been gained in action with our own troops who are highly disciplined; and I can conscientiously say I have never yet seen our troops go into action, or when called upon to storm a position, or to advance for any length of time under a heavy fire, I have never seen them do so without confusion. I have never seen an instance of any position being assaulted in which companies and battalions were not mixed in a very curious way; the

statement read by Colonel Maurice in reference to what took place in Egypt was, I can vouch for it, absolutely true. There have been, during the course of our discussion, several references to the subject of the size of our companies. We know it is a point upon which several officers have very decided opinions. Sir Lumley Graham in his very interesting remarks referred to it, and it is one of the few points I would really like to say a little upon, because I know there has been spread abroad throughout the army a sort of idea that because the Germans were successful with large companies, therefore we ought to follow their example. I do not think anybody can accuse me of being a great Conservative in military matters, when I think there is any necessity for change; but when I think of all the mad things to do in this world, it is the wildest to adopt the fighting and administrative formations of another army, simply because that army has been successful. I am sure that even those who, like Sir Lumley Graham, are in favour of these large companies, will bear me out in saying that the origin of these large companies is very easily to be traced. It did not arise from any conviction on the part of the German Officers that large companies were the best formation or the best system of dividing your regiments and battalions. On the contrary, we know perfectly well that large companies have their origin in two facts: first of all in the poverty of Prussia, the actual want of money, the necessity for their being most economical in every way in order to be able to possess a very large army; and, secondly, and this enters very largely into the calculations, the great difficulty of obtaining Officers. As we all know, the Germans do not allow men to become Officers unless they are men of a certain social position; the number of men occupying that social position is limited in every country, and consequently they could not in Prussia or Germany supply the number of Officers that would be required under an organization which compelled them to divide their battalions into eight companies as we do, instead of into four as they do. I have a paper here which has been handed to me since I entered this theatre to-day, which gives an account of the number of Officers wanted in the German Army on a certain recent date. In the greatest of the military newspapers of Germany, it was stated on the 3rd of March, 1880, that there were then in the German Army 10,000 Officers deficient. I do not know what number there is wanting to complete at the present moment, but I have no doubt it has not been very much improved since then. When you think of 10,000 Officers being required to fill up the vacancies then in their army, you may imagine what would be their requirements after the first two or three serious actions of a war, knowing how many they must necessarily lose in an action.

Sir LUMLEY GRAHAM: The 10,000 Officers deficient, I suppose, refers to the war establishment?

The CHAIRMAN: Yes; and of those 10,000 you can always calculate upon 5,000 coming from the retired Officers, but that would leave 5,000 still wanting.

Sir BEAUCHAMP WALKER: The war establishment of Officers differs very little from the peace.

The CHAIRMAN: In 1882, in the "Cologne Gazette" of the 29th of August, it is stated that there were 700 Second Lieutenants deficient, and in one regiment there were twenty-eight wanting. To give you an idea of what their losses were, at Wörth alone one regiment lost thirty Officers, and another forty-six. These figures go to prove that they really have not the Officers to make small companies. But what I especially want to point out on this subject is the faultiness of very large companies from a tactical point of view. Great stress has been laid upon the mixing up in action of companies and battalions, but more especially of companies. If you have to send forward a company to reinforce the actual fighting line, the smaller that company is, the more easily it will be introduced into the fighting line without mixing it up with the companies already there. I follow as well as I can the military writings of the present day, and the impression left on my mind by them is, that the tendency of military thought throughout Europe at the present moment is not in favour of large companies, but tends towards the advocacy of small companies. I find in most of the regulations laid down for the guidance of foreign armies, frequent allusion is made to fighting in groups. What is a group? Nothing more than one of our small companies. Remember the great difficulty in which an Officer is placed when in command of a very large company such as that

to be found in the German army, and which is nothing more nor less than a small battalion, because it is utterly impossible for him to direct or control anything like a company of such proportions. I believe it is utterly impossible for any man in action to lead, control, and give the proper impulse to a company larger than 100 men. I have myself over and over again in action commanded a company of 100 men, and I candidly confess, although my company was very well drilled, before I had been in action two or three hours, I had lost a considerable body of my 100 men: they turned up afterwards, but they had gone off here and there with corporals and sergeants into groups. I had not that power over them which I ought to have had. Had they been fifty or sixty men, I should have had them under my eye; they would have followed me everywhere; but spread out as they were in those days in skirmishing order, it was absolutely impossible to direct or control a company of 100 men. I hope sincerely no love of change will ever induce our authorities for one moment to imitate a system which, as I maintain, was created not for any tactical reasons, but which was called into existence to meet the exigencies of a very poor country, that could only afford to have a large army by reducing, as it did, the proportion of Officers to men, and on account of the impossibility of obtaining the number of Officers required under a system of small companies. I ought to say I am most certainly a believer in long-range firing. I maintain that a battalion of men, or half a battalion, or a quarter of a battalion, drawn up anywhere, firing at 2,000 yards—the range having been calculated—at a place where it is known there is a large force of artillery, will give that artillery a very bad time of it indeed, and the troops drawn up in the neighbourhood of that artillery as supports to it, or as the reserves for the troops already in action, if they came under volleys fired at 2,000 yards, would suffer very severely. I quite agree as to the value of the machine-gun in the field. I believe there is an enormous future for it, for the very reason that it will increase the effect and will aid in the power of long-range infantry volley-firing. The machine-gun will take the place of considerable bodies of men, and when supplied with plenty of ammunition, which it is the duty of those who have charge of an army to provide, I believe there is a very great future for the machine-gun, and that that General or that nation which knows how to develop and make use of it will in the future have a very great opportunity—an opportunity that has never been made use of by any one before. With regard to the artillery, it is rather a difficult subject for me to dwell upon. I am not an artilleryman, and therefore perhaps I may lay myself open to an accusation to which I think the lecturer has laid himself open, namely, "that there is nothing like leather;" for I think he has laid too much stress upon the actual effect of artillery in action. No one has a higher opinion of artillery, and especially of our artillery, than I have. I believe in the virtue of their fire; it is a very disagreeable thing to be under, but I know the very great difficulties that are entailed in order to obtain very good practice in action, and from my experience and from what I have read of the recent actions in the great wars of 1866 and 1870, I confess I do not believe in the great and enormous effects which it is said that artillery fire produces at all times. In the course of his remarks, Colonel Brackenbury has himself, by the statistics he has given us, explained how it comes that the actual losses inflicted by artillery in action are so small. He laid the greatest stress—in fact, the pith of his lecture was to point out the absolute necessity of grappling with your enemy; you must get at him, he said, as soon as possible. We find that the damage inflicted by infantry or artillery fire increases in very rapid proportion the nearer you get to your enemy. We know that in the great battles of recent times, the artillery fire was delivered at ranges of 1,500 and 2,000 yards. Now, according to the statistics that Colonel Brackenbury has read to us regarding the effect of artillery fire, where it must be remembered the guns used were not being fired at at all, and those serving them were well aware of range, yet the number of hits were not so overwhelmingly great at long ranges. Yet it is at these long ranges artillery fire can alone, in my opinion, be delivered, as a rule, in action. To push your guns forward into the infantry fighting line, as some propose, would, with our present long-ranging field pieces, be an act of folly—of course there must always be exceptions to all such rules—if it were practicable, which I do not conceive it to be. If one can attach any importance to the statistics given over and over again by German and French writers as to the losses inflicted

upon the two armies by artillery and infantry fire, we find that the loss by artillery fire was very small indeed compared to that inflicted by the rifled musket. I believe there is a great future for shrapnel. We have never yet seen what artillery fire can do in the field, because we have never yet had two armies fighting one against the other, each of which had a really effective shrapnel shell; but still I cannot help thinking we shall always obtain from infantry fire a much larger result than we can ever expect from artillery fire. Infantry fire begun at long ranges increases in intensity during an action, because the infantry must advance nearer and nearer on each side, whilst practically the artillery employed will continue to fire at long ranges until one side or other obtains some decisive advantage. I quite agree with what Colonel Brackenbury said about the massing of guns. I know that it is absolutely necessary to do so if you want to make a great effect, especially because I believe the effect of artillery fire to be more moral than physical, and therefore I think the more you mass your guns, the greater that effect will be. With reference to cavalry and mounted infantry, I shall merely say, and I say it with great diffidence in the presence of Sir Beauchamp Walker, that although during the German manœuvres, at which I was present, two years ago, a considerable force of cavalry was employed, for we had two army corps and a division of cavalry, during the whole of those manœuvres, I only once saw a squadron dismounted, and when this squadron did act on foot, I must say it did not seem to be a very effective operation. Their cuirassiers were armed with long horse pistols, like what our highwaymen used to carry, and their lancers had a very small proportion of carbines. I remember His Royal Highness the Duke of Cambridge particularly remarking upon that point. You must make the greatest possible distinction between cavalry and mounted infantry. I look upon our cavalry as one of the finest branches of our Army, the best drilled and composed of the best class of our men. It is a most splendid service, and I believe it to be the finest cavalry in the world. Because I think it is so fine, and because we have such a small quantity of it, I should be very sorry to see it turned into bad infantry. I believe it is magnificent for the uses for which it is designed, that is to fight mounted, whilst if the necessity came for them to fight on foot—if they had to seize a bridge or hold temporarily some advanced position—I believe they would do it as well as any other cavalry in the world; but I do not think they would do it as well as infantry. They ought, in my opinion, to have it impressed upon them that their principal *métier* is to fight on horseback, and I hope they will never be converted into bad infantry. With regard to mounted infantry, I believe them to be an absolute necessity with every army; the army that will take the field and go into the field without mounted infantry and with cavalry only—if the German army, magnificent as it is, has ever to encounter an army of equal strength, having with it a large force of mounted infantry—all I can say is, the German cavalry, in my opinion, will have a very bad time of it. Mounted infantry have all the necessary mobility of cavalry, and they have the instruction of the infantry soldier at the same time. I should indeed be very sorry to see any attempt made with our very small Army to convert part of it during peace into mounted infantry. When the time comes we know we can raise a very fair body of mounted infantry. Lord Chelmsford did so in South Africa, and many other Generals have done so before and since, and wherever we have used them we have invariably found them to be of the greatest possible service. I always found the first people to call for their services in action were the cavalry. The cavalry always said, "Where are the mounted infantry?" They did not wish to dismount themselves, and very properly so; they had mounted infantry with them, and the mounted infantry were invented for that purpose. For these reasons I hope we shall not attempt to start any mounted infantry in this country unless the Government would wish to add 5,000 or 10,000 men to the Army, and then I should say by all means do so. The last notice on the paper is "Responsibility." I think we shall all recognize the fact that the recent development of tactics vastly increases the responsibility of all junior regimental Officers and non-commissioned officers in action; hence the absolute necessity of teaching them the science and art of their noble profession, in a manner and to a degree never dreamt of in former ages. No one can have a higher opinion of our Officers than I have. I know what they are made of, and I concur in all that has been said as to their merits; indeed, I would go much

further and say, such is my conviction of the desire of the British regimental Officer to learn his profession, that if he is not as thoroughly instructed as he ought to be, the fault will lie not with him, but with men like myself and Sir Beauchamp Walker, with men holding high positions in the Army. All ranks are now most anxious to learn. I have heard for years and years past a cry on all sides from our regimental Officers: "Teach us, give us the opportunity to learn, and we shall show you what we can do." I have now the very agreeable task of, in your name, thanking Colonel Brackenbury for his very instructive lecture; and, might I also add, of thanking those who have been good enough to take part in the subsequent discussion? I am sure we have learned a great deal from what we have heard, and if I might venture to single out any one, I would say how valuable were the remarks that fell from Colonel Hale. The manner in which he comes forward here at all times to give us instruction is worthy of the highest praise.

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This portion of the Number is reserved for Articles, either Original or Compiled, on Professional Subjects connected with Foreign Naval and Military matters; also for Notices of Professional Books, either Foreign or English.

It is requested that communications or books for review may be addressed to Colonel Lonsdale Hale, at the Royal United Service Institution, Whitehall Yard, London, S.W.

THE RUSSIAN ARMY IN 1882.

(Continued from No. CXIX.)

By Colonel Sir Lumley Graham, Bart.

Part II.

The Cossacks.

The Cossacks have generally been classed under the head of irregular troops, and justly so until of late years; but now that all Cossack cavalry regiments of the first category are brigaded with the regulars, and are to all intents and purposes regular troops, it seems more appropriate to classify them as such, and to give a description of them in this place, particularly when we reflect upon the importance attached to them by many Russian Officers, who consider them the beau ideal of cavalry.

The Cossacks (*i.e.*, "robbers" or "freebooters") sprang originally from two confederations of military adventurers, who, during the wars between Russia and Poland, took part sometimes with one side, sometimes with the other. One of those confederations was formed on the islands of the lower Dnieper in the 13th and 14th centuries, while the other was established in the marshes of the Don and Volga in the 15th century. The latter body was broken up in 1577, when Ivan IV sent an army against it. Its fractions moved eastward and southward; one band conquering Siberia, another establishing itself at Uralsk, a third occupying Astrakhan, while a fourth made its way into the Caucasus. The Cossack chief, Yermak, having presented Siberia to the Czar, it became part of the Russian dominions, and Cossack colonies were pushed forward along its frontiers. In 1773 revolts having occurred amongst the Don and Volga Cossacks, many of them were transported to the Caucasian frontier, where they colonized the banks of the Terek.

In 1778 the confederation on the Dnieper was finally dissolved, its members being induced to settle on the banks of the Kuban, then the frontier between Russia and Turkey.

These various Cossack colonies, which thus became the pioneers of Russian advance into Asia, were at first independent, but gradually came under Russian subjection and under special conditions of military service, which held good until 1875, and which were substantially as follows:—Every Cossack, with a few exceptions, was bound to serve for a fixed number of years, generally for twenty-two, of which fifteen away from his home, and seven in the Opoltchenié (militia) at home, providing his own horse, arms, and equipment, and receiving pay only when on service away from home.

New regulations came into force on January 1, 1875, being applied at first

only to the Don Cossacks, but being afterwards extended to all the other bands. Under this system the Cossack contingent is divided into two portions—the active portion and the Opoltchenié, the former being subdivided into three classes—the *preparatory*, the *field*, and the *reserve*. The conditions of service in each portion and class are very similar in the various Cossack regions. We will give those which apply to the Cossacks of the Don—the most numerous and important of all. Every youth capable of bearing arms (with certain family exemptions), on attaining the age of eighteen enters the *preparatory class*, in which he remains three years, during the first of which he is not required to perform any military duty, but must provide himself with a horse, equipment, and arms (except the Berdan rifle, half the cost of which is defrayed by the Government, half by the military treasury of the Cossack territory).

During the next two years he is carefully trained, remaining, however, at his native village (stanitza). At twenty-one years of age, the young Cossack enters the *field class* for twelve years, divided into three equal periods, during the first of which he serves in one of the four squadrons of Cossacks of the Guard, in one of the twenty regiments of Cossacks of the Line, or in the battery of the Guard, or in one of the seven field batteries, all of which are in the first category of the field class, and are embodied in Divisions of the standing Army. During the next four years, *i.e.*, from the age of twenty-five to twenty-nine, the Cossack belongs to the second category of the *field class*, comprising Regiments Nos. 21—40, and Batteries Nos. 8—14. Officers and men of these regiments remain at home, but must keep their whole equipment, and also their horses, ready for immediate service. For the next four years, that is until they have completed their thirty-second year, the men belong to Regiments Nos. 41—60, and to Batteries Nos. 15—21, forming the third category of the field class. They must keep their equipment in readiness for service, but are not required to provide themselves with horses except on mobilization. When belonging to the second and third categories, they are liable to be called out for three trainings, not exceeding three weeks each. Batteries forming part of the same categories only have four guns horsed in peace-time. Cossacks of superior education enjoy the same privileges as other soldiers in the Russian Army, with regard to reduction of the lengths of service with the colours and to facilities for obtaining the ranks of non-commissioned officer and of Officer. From the *field class* the Cossack passes into the *reserve* for five years, being during this time liable, in time of war, to be drafted into the active Army or into a reserve regiment. After this, that is, after completing his thirty-seventh year, the Cossack is drafted into the Opoltchenié, to which belong also all other able-bodied men who, for one reason or another, have not been embodied in the field class. To this force, which will only be called out under very exceptional circumstances, the Cossack is attached for four years, when, at forty-two years of age, he is exempt from all further liability.

The *Ural Cossacks* are still under the conditions of service which prevailed generally up to 1875, except that the field class is divided, as elsewhere, into three categories ; regiments in the first category not being filled up from a roster, like those of the Don Cossacks, but by volunteers from the other categories who receive a bounty, and must serve at least one year before being replaced.

All Cossacks are exempt from poll tax while serving in the field class.

Promotion from the Ranks.—A Cossack must serve from two months to two years, according to his educational attainments, before he becomes eligible for the post of non-commissioned officer (Urjadnit). Candidates for an Officer's commission must have served regimentally for from three to eighteen months, according to their educational proficiency, and have afterwards passed directly the prescribed examination at one of the military schools, or at the end of a course of instruction in the same.

Candidates of the lowest educational grade are not allowed to come up for examination under three years' service, of which one as non-commissioned officer; after passing, those who succeed best are at once made Officers, the remainder becoming "Sub-Ensigns" (Podchormeschi), when they rise, as vacancies occur, to the rank of "Ensign" (Chorunschi). Further advancement is regulated as for the Army in general. The Cossack Officer's corps is recruited partly from "Sub-Ensigns" who have gone through the military schools, and some of whom are not Cossacks; partly from men who have performed their term of service in the ranks, and, after being discharged, have rejoined the colours; partly, again, of Officers detached from the regular Army to do duty in Cossack regiments. The standard of education required to qualify non-commissioned officers, after the conclusion of their service, for promotion to the rank of Officers is not very high, being as follows:—a knowledge of the Catechism, of reading, writing, the first four rules of arithmetic, and the principles of outpost duty. Officers drawn from this source are, however, it is said, by no means the worst, and are in the proportion of 28 per cent. of the whole number; some 39 per cent. come from the military schools; 13 per cent. are detached from the regular Army; 14 per cent. men who have served their time and have rejoined after discharge; 1 per cent. civilian officials transferred to the Army; 2 per cent. transferred from other Cossack Corps; and, lastly, 3 per cent. promoted from the ranks for good service.

The number of Cossack Officers transferred to the regular Army is quite as large as that of Officers detached from it to Cossack regiments.

In order to hasten on the improvement in professional training of the present generation of young Officers, all "Sub-Ensigns" are now, immediately after passing their examination, appointed to field-regiments, the best being selected for the Guard; and about twice as many Officers are employed in peace-time with the field regiments as are required for the war establishment. But few of the Generals, commanders of regiments, or other superior Officers come from the regular Army or from the non-Cossack population; for instance, in the Returns of 1879, we find in the Don Cossack contingent 34 Generals out of 36, 317 Field Officers out of 321, and 1,392 other Officers of the higher grades out of 1,425 who were of Cossack origin. On the other hand, but few doctors or Officers of the civil departments are Cossacks. The pay and allowances of Officers in active employ are the same as in the Army at large, and, as with it, considerable additions have been made to their emoluments quite lately, in the form of table allowance and of assistance in the foundation and maintenance of messes. As yet, however, the allowance of a ration for a second horse, which has not long ago been granted to the regular Cavalry and Artillery, has not been extended to the Cossacks.

The Cossack horseman, except those of the Caucasus, is armed with a very long lance or pike, without a bannerole, with the national sabre (schaschka) without a guard, and suspended over the right shoulder, and the Berdan rifle, in a leather case, hanging behind. The Cossacks of the Caucasus have, in addition, pistols and daggers (kinschal). Sergeant-majors and non-combatants are armed with revolvers.[1]

The uniform consists of a comfortable blue coat (kaftan), pantaloons with red trimming, high boots, a fur cap, a cloak and cape like that of the Line Cavalry. Round the waist is worn a belt, on which hang two pouches, each containing twenty rounds. Officers of all the regiments, and other ranks of the Guard squadrons, wear spurs; but the other Cossacks carry the native whip (nagaska). Officers wear epaulets, and their badges of rank are the same as in the rest of the Army. In the winter, fur jackets and other warm articles of clothing are worn. The Cossacks of the Guard are more richly

[1] By a decree dated 22nd April, 1883, the rear rank men of Cossack regiments are deprived of their lances. The Lancers and Cuirassiers of the Guard remain as heretofore, but the Hussars of the Guard lose their lances altogether.

dressed, and, indeed, in a similar manner to the remainder of the Guard Cavalry. The horses' equipment differs from that of the other Cavalry, in having a pad attached behind the saddle-tree for carrying necessaries, in having the woylach over the saddle, no wallets, and a smaller valise. A chabraque is thrown over everything.

The snaffle, even for Officers, takes the place of the bit. The Cossack's seat is peculiar, high up above his horse, with very short stirrups.

The supply of horses has rather fallen off of late years (though still very considerable), in consequence of the spread of agriculture and of other industries at the expense of horse-breeding, which has resulted in the break-up of many breeding studs, so much so that on certain occasions, when there was a great demand for horses for military purposes, it was difficult to find the right sort of animal; so that measures were taken by the Government to encourage horse-breeding, which have already begun to tell. Thorough-breds have been introduced and race-meetings started.

In some parts of the Cossack regions the horses are much better than in others, hence a great difference may be remarked as to quality in the remounts of the different regiments according to the locality whence they draw their supply. As a rule, however, the horses of the Steppe maintain their high character for endurance, hardihood, and sureness of foot, in consequence of which the number of purchases made of them for the cavalry and artillery of the Army in general is constantly increasing, and thus the price which the Cossack has to pay for them becomes higher and higher. An Officer receives compensation to the amount of 125 roubles (about 18*l.* 10*s.*), and a non-commissioned officer or private to that of 43 roubles (about 7*l.* 2*s.* 6*d.*), for the loss of a horse.

Cossacks, whilst actually serving, further receive a remount allowance, which also helps to maintain the equipment. Pack-horses are kept up by savings out of the forage allowance.

In consequence of the comparative scarcity of horses, there are at present a good many dismounted men in the Cossack field regiments. In war-time the Cossack helps himself to a remount as best he can; for there are no remount depôts, and consequently a Cossack regiment on active service is apt to melt away rapidly. The poorer Cossacks are assisted out of the public funds of the horde in maintaining horses and equipment. In former days the articles purchased were generally cheap and bad, the arms being of such bad metal as to be of little use, clothing and equipment being often handed down from father to son, and thus not seldom wanting in uniformity. Now things are very different, and one sees Cossack regiments as well got up as any of the Line Cavalry. In December, 1881, the establishment of the Cossack Cavalry was as follows:—

	Officers.	N.-C. Officers.	Musicians.	Cossacks.	Civil officials.	Non-combatants.	Officers' servants.	Troop horses.
The Life Guard Regiment of 6 squadrons, *in war* ..	53	96	25	960	6	90	65	1176
The combined Life Guard Regiment of 4 squadrons, *in peace*	38	64	25	640	6	61	48	780
A Don regiment of 6 sotnias, *in war*	21	86	19	782	3	65	—	932
Ditto *in peace*	32	56	19	838	3	53	—	923
A Life Guard, Kuban or Terek squadron	8	16	4	160	—	18	8	191
A Kuban regiment of 6 sotnias, *in war*	21	56	19	798	2	28	—	992

	Officers.	N.-C. officers.	Musicians.	Cossacks.	Civil officials.	Non-combatants.	Officers' servants.	Troop horses.
A Kuban regiment of 6 sotnias, *in peace*	42	56	19	798	2	28	—	942
A Terek regiment of 4 sotnias, *in war*	15	38	13	532	2	21	—	618
Ditto *in peace*	30	38	13	532	2	21	—	633
An Orenburg regiment of 6 sotnias, *in war*	21	92	19	784	2	78	—	964
Ditto of 5 sotnias, *in peace*	30	47	16	706	2	64	—	774
An Ural regiment of 6 sotnias, *in war*	21	92	19	784	2	78	—	963
Ditto *in peace*	34	56	19	843	2	71	—	925
A Life Guard Ural squadron, *in war*	8	17	4	160	—	18	9	195
Ditto *in peace*	8	17	4	128	—	18	9	159
An Astrakhan regiment of 4 sotnias, *in war*	15	38	15	532	1	21	—	618
Ditto *in peace*	30	38	13	532	1	22	—	633

The Training given to the Cossacks, and the Nature of their Duty.

In the olden time the Cossack, being in constant contact with the enemy, was from his very childhood a natural soldier, equally accustomed to fighting on foot and on horseback. In these later days this has ceased to be the case; for a state of warfare now, instead of being constant, is only exceptional. Artificial training has therefore to be substituted for that of his daily life, which was formerly sufficient without any systematic instruction. He receives this now from the State. Whilst still a boy, he learns in his native village the use of arms; he is taught riding, foot drill, and the art of shooting. When he enters the preparatory class, or rather during the last two years' service in it, these exercises are conducted in a thoroughly serviceable manner, the youths being assembled in larger or smaller bodies for fifty-five days annually at certain centres under special instructors. Thus, the young Cossack, when called out to join the "service class," enters it as a thoroughly drilled soldier, often excelling the older men, who not seldom lose somewhat of their military efficiency owing to frequent employment as orderlies or on similar detached duties.

The duties which Cossack troops are required to perform, and the regulations under which they serve, are pretty much the same as with the Army at large. This applies to Infantry and Artillery, as well as to Cavalry. It is true, however, that less uniformity of appearance is insisted upon in the case of Cossack horsemen than in that of the Line Cavalry; also less steadiness and cohesion is necessary, less display of proficiency in the riding-school; but, on the other hand, the Cossack is expected to be more formidable in single combat, a better rider across country, more skilful as a partisan on outpost and reconnoitring duty than his comrade in the regulars, whilst he is at the same time his equal in fighting on foot.

But, as we have before remarked, since the Cossack regiments of the first category have been embodied in the Cavalry Divisions, these distinctions have become less marked, and bid fair to disappear in time, each description of troops borrowing more and more from its sister corps. Already the term "irregular" is no longer applicable to Cossack regiments of the first category; and as regiments of the second and third categories are mainly composed of men who have served in the first category, the same may also be said of the latter corps. The Cossack hordes, however, which are domiciled more to the East have preserved their "irregular" characteristics to a greater extent: for instance, the Cossacks of the Ural retain a form of substitution, which the

Government would be glad to do away with, but has not as yet judged it expedient to do so.

The principal tactical peculiarity of the Cossacks is the so-called "lawa," a modified form of the attack "en fourageurs," as practised by the regulars. It is carried out as follows:—A sotnia will extend to two and a half times its own breadth when in line, forming rank entire; at fifty paces in rear is a small support, composed of a few horsemen, to serve as a rallying-point after the charge. The "lawa" is intended to surprise the enemy by rapidity of movement, and to outflank him. An entire regiment may form two "lawas," with three "sotnias" extended in first line, two extended in second line échelonéd on the flanks, and the sixth sotnia following in close order, as a reserve.

Cossack regiments labour under one very serious disadvantage, which must greatly detract from their efficiency in war, and that is the small establishment of Officers; for, besides its Captain, the sotnia has on its strength only two Officers, of whom one is generally detached; so that in case of casualties there is frequently only one, sometimes not a single Officer, present with it. And this defect is all the more felt because the nature of the service for which Cossacks are particularly adapted requires frequent small detachments to be made. The establishment, too, of fourteen files per section is too small for war; and it is seriously contemplated to organize the regiment in four sotnias, instead of six, retaining the same total number of combatants.[1] In this manner the efficiency of the sotnia and of the section will be increased. Another defect in organization is the small number of surgeons and hospital attendants, as well as of tradesmen, owing to which latter want clothing and equipment go to the bad very much on service.

The regimental transport of Cossack troops is chiefly composed of pack-animals. Each Don regiment used to have 32 horses in peace time and 75 in war, including those for draught; but when the order for reduction of the military budget was issued, December 29, 1881, the peace establishment was cut down to 21. This reduction, though certainly an economy, will be productive of some difficulty whenever it becomes necessary to mobilize, as a greater number of horses will then be required to complete the establishment. There is a feeling amongst the Cossacks that it would be well to substitute wheel transport for pack transport, and there cannot be a doubt that they are right with regard to regular operations carried on in countries well provided with roads, though, for the rapid raids which Cossack cavalry may be expected to execute, what little baggage it may be absolutely necessary to take will probably be best transported on very lightly loaded pack-animals.

Resources, in point of Men and Horses, available in the Cossack Territories.

A table appears in the "Armed Strength of Russia," giving an estimate of the male population of the different Cossack regions, and of the number of horses in the same available for all purposes.

The estimates were made at different periods for the different regions—the earliest in 1867, the latest in 1877, the most important (that concerning the Don Cossacks) in 1875. The total male population is put at 966,323; the total number of horses at 1,193,317; the male population in the Don territory at 376,092, and the number of horses at 419,589.

There is every reason to believe that the entire number of males may now be safely reckoned as considerably over 1,000,000, and that of the Don Cossack males at 400,000. As for the horses, it is probable that, for reasons previously given, their number has not largely, if at all, increased.

Now, we find that over 61,000 men are required for the different regiments

[1] It will be curious if this is carried out just as the rest of the cavalry is upon the point of adopting the present Cossack organization in six squadrons.

and batteries comprising the Don contingent when on a war footing, and this includes the infantry (all local corps for home service and in small numbers). The cavalry alone amount to about 50,000 men. It is estimated that, over and above the number of soldiers thus required for the field army, there remain in reserve some 90,000 trained men fit for service.

In the year 1856, at the end of the Crimean war, the male population of the Don territory was only 272,437; there were at that time 71,772 Don Cossacks in the ranks.

In July, 1878, under the new system, with a male population of over 380,000, the Don territory furnished 47,957 soldiers, all of the 1st category. The mobilization of regiments in the 2nd and 3rd categories was effected with fair expedition, and without encountering any serious difficulty. The regiments of the 2nd category were called out on April 3, 1877, and were entrained on May 1st; those of the 3rd category were summoned on April 17, 1878, and commenced their entrainment on May 3rd. The machinery for mobilization has since that time been greatly improved, to which improvement the railway and electric telegraph largely contribute. It is thought, therefore, that all the forty regiments of the 2nd and 3rd categories may be mobilized under three weeks; twenty more reserve regiments might be raised, and be ready for service within four weeks at latest, assuming that the expense of horsing them were defrayed out of the very rich military chest of the territory, an expense which would not swallow up more than 38 per cent. of its capital. At the same time, it cannot be denied that such an expenditure of force would cripple the territory for a long time, for the conditions of military service fall harder upon the Cossacks than upon the other subjects of the Empire.

Seventeen Don Cossacks per 1,000 are enrolled annually in peace time, against 4·8 per 1,000 in the Empire generally, whilst in war the proportion is as 245 in Cossackia to 57 elsewhere. Again, including his marches to and fro, the Cossack serves fully as long as other soldiers. Then he has to spend at least 23*l.* on his outfit, which he has afterwards to keep up, in addition to finding his own horse, and keeping it for four years after completing his service with the colours, without being able to make much use of it for his own purposes. The loss of time, too, is of consequence to him when called out for the summer drills and such like. The Cossack has an advantage over other Russian subjects in paying lower taxes; but it is calculated that, even taking this into consideration, he is mulcted for State purposes to the amount of 2*l.* 12*s.* a year during his twenty years of service, whilst his fellow-countrymen are only taxed to the amount of about 1*l.* 3*s.* a head per annum; moreover, if the Don territory were subject to the ordinary law of conscription, it would supply a yearly contingent of only 1,500 recruits, instead of the 6,112 now enrolled. The Don Cossack, however, fortunately looks upon himself as a privileged man, in consequence of these hard terms of service, and would not exchange them willingly for those in force elsewhere. It is therefore allowable to suppose that Russian optimists, who maintain that Don Cossackia will at need furnish 100 regiments, and even more, for the defence of the Empire, are not as imaginative as may at first sight appear.

With regard to the smaller Cossack hordes, no assistance whatever is to be expected from those of Asia towards carrying on an European war, whilst from those of the Ural, Orenberg, and the Caucasus the supply of warriors would be very uncertain, depending, as it would, upon the demands made upon those hordes for the defence of their own homes, and being, moreover, much impeded by the distances to be traversed and by the deficiency of communications. The last war furnishes us with fair data for forming an estimate upon this point. The Kuban and Terek hordes placed in the field the whole of the tactical bodies which they were bound to organize; the Orenbergers turned out 77 per cent. of their establishment; and the only difficulty as to

mobilization occurred in the Kuban territory. Out of 8,900 men of the 3rd category only 5,318 could mount themselves, so that the remainder were necessarily employed as infantry. In the Terek region, on the contrary, the regiments of both 2nd and 3rd category were formed without any trouble, 1,227 men remaining, moreover, as a reserve. All the three Astrakhan regiments were embodied. They were, however, short of Officers, who were detached to them from the Don contingent. The first ten cavalry regiments of the Kuban horde were ready in ten days; the next five in fifteen days. Mobilization in Uralia took more time than elsewhere in consequence of the defective telegraphic communication. But this will be remedied ere long, and so will also the insufficiency of railroads; and then, even if each of the minor hordes has to employ half its force at home or in Asia, the remainder, amounting to 200 sotnias and from 40 to 50 guns, will, according to a great authority on Cossack matters, Mr. Choroschin, be available for service on any theatre of war whatever. When we add this force to that furnished according to regulation by the Don territory, namely 372 squadrons or sotnias and 132 guns, and again unite with it the Baschkirs, Crim-Tartars, and other foreign elements, we arrive at a grand total of 600 sotnias of Cossack horsemen, supported by from 170 to 180 guns. But this is not all. Suppose that, in a time of great national danger, the whole effective force of Cossackia were called into the field, a host would be mustered consisting of 768 sotnias of cavalry, besides 30 of infantry and 222 guns; that is to say, of nearly 138,000 combatants of all ranks.

If, again, we add to this vast host the Asiatic irregulars, we raise our grand total to nearly 166,000 of all ranks.

The proportion of Cossacks in the different arms, taking the whole army for comparison, is 1 per cent. in the Infantry, 70 per cent. in the Cavalry, and 60 per cent. in the Horse Artillery. We remarked before upon the large percentage of soldiers furnished annually by the Cossack contingent. Large as this is, however, it has been reduced by nearly one-half during the last twenty-five years, as the following figures will show:—In 1856, with a male population of 722,793, 218 per 1,000, or over 21 per cent., were enrolled; whilst at the present time (1882), with a male population of 1,069,954, only 146 per 1,000, or 14·6. per cent., are liable for service at the same time. On the 1st January, 1881, only one-third of the fixed establishment, and 4·8 per cent. of the whole male Cossack population, was under arms. In the course of one year the total population of the Cossack region had increased by 84,660 souls, whilst the number of men liable for service had been augmented by 16,894, or 1·7 per cent. We cannot doubt, after studying these figures, that the Cossack hordes constitute an almost inexhaustible supply of horsemen for the Russian army. Having disposed of the question of *quantity*, what is to be said of the *quality* of these troops? Upon this question there is a very great difference of opinion amongst Russian Officers. One school extols the Cossack to the skies, cannot speak too highly of his warlike qualities—of his quickness, endurance, tractability, natural intelligence, &c.—looks upon him as the model to be set up for imitation by all mounted soldiers; in a word, wishes to Cossackize the regular cavalry. This is one extreme. Another school consists of admirers of regular cavalry after the orthodox pattern, and speaks of the Cossack in terms of the greatest depreciation. According to these gentlemen, the Cossack is insubordinate, undisciplined, unreliable, lazy, wanting in solidity, even more afraid of firearms than he ought to be. Unless regularly trained and led, he is only fit for such inferior work as escort or orderly duty, forays on defenceless villages, foraging, and the pursuit of a demoralized enemy. Those who hold these views wish to regularize the Cossacks, just as those of the other extreme school wish to Cossackize the regulars. Truth lies doubtless, as usual, between the two. The Cossacks, excepting those of the Caucasus, have long ceased to have the opportunity which their forefathers

enjoyed of gaining warlike experience by their daily life ; this must therefore be replaced, as far as may be, by instruction as it is. On the other hand, regular Russian cavalry has been remarkable for its heaviness, and for the want of sympathy between man and horse ; so that it is natural that the ardent spirits who dream of emulating the deeds of Jackson and Stewart should place but little confidence in troops so manifestly unfit to carry out their views, and should turn their eyes with hope to the countless Cossack hordes.

We have stated the extreme views held by two parties in Russia upon their value in war. Of course the shades of opinion between those two are many and various. Before quitting the subject, we may recall to our memory the estimation in which the Cossacks were held by their opponents in actual warfare. This will, perhaps, be even a better guide to us than the opinions of their friends and countrymen.

The Cossack was not well known in Western Europe till the campaign of 1812. His reputation was then established, and, although he has not done much to raise it since the termination of the Napoleonic era, the impression which he then made has never been effaced from the imaginations of the inhabitants of the countries in which he appeared either as friend or foe. He was doubtless unpleasant in either capacity. We have only to deal with him from the latter point of view. It is sufficient to read Napoleon's despatches and orders, and the numerous military memoirs of the day, to be convinced of the great effect produced by the rapid movements and constant desultory attacks of the Cossack horsemen, even during the advance on Moscow. During the halt and subsequent retreat, the Cossack was ubiquitous. No straggler had a chance, and in the demoralized state of the French army the terror inspired by these savage horsemen was extreme. The fame of their deeds spread westward as they advanced, and had its effect upon the new French levies. We find Napoleon constantly complaining of the mischief done by what he calls "this contemptible cavalry, which only makes a noise, and would be unable to break a company of infantry." And this, though perhaps a somewhat exaggerated statement, does not seem to have been very far from the truth. The Cossack, dangerous as he was against a disorganized or demoralized enemy, never appears to have gained great credit as a combatant. Probably the Cossack of the present day is not very unlike his ancestors in this respect ; but we doubt not that, however this may be, the presence of Cossack cavalry will make itself unmistakably felt in the next great war in which Russia is engaged.[1]

The Cossack Department at Head-quarters.

The general administration and command of the Cossack troops rests with the above-named Department, which appertains to the War Ministry. The present heir to the throne, the Grand Duke Nicholas, is the "Ataman" or Head of the Department and Chief of the Cossacks. Under this Department are the commissions of the different Cossack territories whose Atamans have similar powers, though somewhat more restricted, to those exercised by the General Governors of Military Districts or the Military Governors of the Asiatic Provinces. In the Don Cossack territory, the most important by far, the administrative arrangements bear, of all, the closest resemblance to those in force generally throughout the Empire.

The "Nakasny-Ataman" gives his directions, with regard to military

[1] We may, perhaps, be doing scant justice to the warlike qualities of the Cossack of the present day, and we recommend our readers to peruse some most interesting articles in Nos. 507 and 508 of the "Revue Militaire de l'Étranger," headed "Notes d'un Cosaques," which gives a translation of a paper by Lieutenant-General Ivan Andrianow, in the "Vaïannyi-Sbornik." This officer commanded a brigade, and afterwards a Division of Don Cossacks during the late war, and speaks very highly of their conduct.

matters, through his Staff, at the head of which is an Officer with the same powers as those of the District Chiefs of the Staff; with regard to civil matters, through the Commission of the territory over which he presides. The territory is divided into five districts for administrative purposes, each of which is under a district Ataman with his Staff. This Officer communicates his orders through the head men of villages and the councils, to which is the last appeal both in military and civil cases, and which regulate all executive details with reference to enrolment, training, and mobilization. A certain number of units are stationed in each district, and, as a rule, each village has to furnish and keep up its own contingent. On mobilization, the number of men called out is divided as equally as may be amongst the different villages.

In war time, the field "Ataman" of the Cossack troops present with the Army occupies the same position as the Commanding Engineer or the Officer commanding the Artillery. The "Nakasny-Atamans" of the minor territories occupy a position analogous to that of the Ataman of the Don Cossacks, only with less independence: for instance, those of Kuban and Terek are under the Viceroy of the Caucasus; whilst those of Orenberg and of the Ural are under the General Governor of Orenberg. Universal liability for military service is the rule throughout all the Cossack territories, where it is even more stringently enforced than in the remainder of the Empire. Each contingent has its own military chest, which is replenished by means of contributions drawn from the population, and especially from those exempted from service. Its funds are applied towards the general expenses of the contingent, and towards aiding the poorer members of the community in fitting themselves out.

Artillery.

The Artillery of the field Army is divided into "Field" and "Horse" Artillery.

The field artillery is made up of heavy, light, and mountain batteries, six of which, constituting a brigade, are attached to each of the 48 Infantry Divisions, including the Guard, the Grenadiers, and the Army of the Caucasus, but exclusive of the Asiatic Divisions. Each battery has 4 guns horsed in peace time, and 8 in war; thus there are 288 batteries, with a full complement of 2,304 guns. There are, besides, two brigades in Turkestan and one in Eastern Siberia, with an independent battery in Western Siberia. These Asiatic brigades have, however, a smaller number of batteries than usual. The brigades bear the same numbers as the Divisions to which they are attached, and three of them are also named after their honorary commanders, members of the Imperial family. The batteries in each brigade are numbered consecutively, the heavy having the lowest, and the mountain (where any) the highest, numbers. The calibre of the guns is as follows:—
A. Heavy, 4·2 in.; B. Light, 3·42 in.; C. Mountain, 2·5 in.

A. Two batteries to each Division of the Guard and of the Grenadiers, to the Caucasus Grenadiers, and to Divisions 1—41 of the Line; one battery to the first Turkestan Division.

B. Four batteries to each of the Guard and Grenadier Divisions, to Line Divisions 1—18, to 22—37, and to 40; two batteries to Line Divisions 19—21, to 38 and 39, to 41, also to the two Turkestan and to the Siberian Divisions.

C. Two batteries to Line Divisions 19—21, to 38 and 39, to 41, also to the two Turkestan and to the Siberian Divisions. Thus, when on a war footing, the Russian Field Artillery turns out 790 heavy guns, 1,488 light guns, and 120 mountain guns; or a total of 2,392 field pieces, including the three Asiatic Divisions.

A field battery is divided, for tactical purposes, into two half batteries, each of which forms two divisions, each of two guns.

There are three recognized establishments to a battery.

1. The peace establishment, with detachments for four divisions, but horses for only four guns and for no ammunition-wagons.

2. The increased establishment, with horses for four ammunition-wagons and one spare gun-carriage, besides four spare horses.

3. The war establishment, when all the guns and wagons are fully horsed, and gun detachments are provided for four field divisions. There are six horses in each gun or wagon team, both in heavy and light batteries. There are sixteen ammunition wagons per heavy and twelve per light battery. Both guns and wagons have poles, and the teams are harnessed in pairs, with a driver for each pair, except in the case of the store wagon, when the horses are four abreast and driven from the box.

PEACE ESTABLISHMENT OF A HEAVY BATTERY OF FIELD ARTILLERY.

Combatants.

Officers.

Battery Commander (Colonel or Lieutenant-Colonel)	1
Half-battery Commanders (1 Captain, 1 Staff-Captain)	2
Subalterns (1 Lieutenant, 1 Sub-Lieutenant, 1 Ensign)	3
Total Officers	6

Non-commissioned Officers and Men.

Sergeant-major....	1
Quartermaster-sergeants	3
Sergeants in charge of divisions	4
Bombardiers	8
Trumpeters	3
Acting bombardiers	46
Gunners and drivers	136
Total non-commissioned officers and men	201
Total all ranks	207
War establishment—Officers	6
Non-commissioned officers and men	236
Total	242

The addition to the peace strength is made up as follows :—

5 extra bombardiers,
10 „ acting bombardiers,
20 „ gunners and drivers.

35 total addition.

The establishment of a light field-battery is the same as that of a heavy battery, except with regard to acting bombardiers and gunners ; there being, of the former, 41 in peace and 46 in war ; of the latter, 106 in peace and 134 in war. The peace establishment of a light field-battery is thus 172 of all ranks ; and the war establishment, 210 of all ranks.

PEACE ESTABLISHMENT OF A MOUNTAIN BATTERY.

Combatants.

Officers.

Commanding battery (Colonel or Lieutenant-Colonel)	1
Commanders of half-batteries (Captains or Staff-Captains)	2
Subalterns	3
Total Officers	6

Non-commissioned Officers and Men.

Sergeant-major....	1
Sergeants in charge of divisions	4
Bombardiers	8
Trumpeters	4
Acting bombardiers	30
Gunners and drivers	80
Total non-commissioned officers and men	127
Total all ranks	133

The war establishment of Officers is the same. On the war establishment there are—

4	extra sergeants.
8	,, bombardiers.
8	,, acting bombardiers.
105	,, gunners.
125	total extra.

The war establishment of the mountain battery is, therefore—

Officers	6
Non-commissioned officers and men	252
Total all ranks	258

PEACE ESTABLISHMENT OF A HORSE ARTILLERY BATTERY.[1]

Combatants.

	Officers.
Commander of battery (Colonel or Lieut.-Colonel)....	1
Captain or Staff-Captain	1
Subalterns	3
Total Officers	5

Non-commissioned Officers and Men.

Sergeant-major	1
Quartermaster-sergeants	3
Sergeants in charge of divisions	3
Bombardiers	7
Trumpeters	3
Acting bombardiers	28
Gunners and drivers	117
Total non-commissioned officers and men	176
Total all ranks	181

The war establishment only differs from the peace establishment by the addition of three bombardiers and one acting bombardier, making a total of all ranks of 185.

The Horse Artillery battery has 6 guns horsed, both in peace and war ; but

[1] It is understood that there will soon be a great augmentation to the Horse Artillery either by increasing the strength of batteries or by adding to their number. The augmentation will be made by degrees in the same manner as in the Cavalry.

only 2 wagons in peace and 9 in war. It is formed in three divisions. Its gun is of the same calibre as that of the light field battery, but it is shorter and lighter than the latter. The ammunition is the same for both guns. The horse artillery battery has, like the field artillery, an "increased establishment," intermediate between those of peace and war, under which the number of horses is increased by 11.

Non-combatants.

The heavy and light field batteries have each the same number of non-combatants (including clerks, hospital attendants, farriers, artificers, and drivers), that is to say, 13 in peace and 24 in war.

A mountain battery has 29 non-combatants in peace and 108 in war.

The horse artillery battery has 15 non-combatants in peace and 26 in war.

Horses.

The *heavy field battery* has, on the peace establishment, 5 Officers' horses, 12 troop horses, 27 draught horses, and 6 horses for the artillery train; on the war establishment, 5 officers' horses, 18 troop horses, 163 draught horses, 14 horses for the artillery train, and an uncertain number of baggage animals. Peace establishment, 50 horses; war establishment, 200 horses, besides baggage animals.

The *light field battery* has the same establishments, except that it has only 137 draught horses in war, or altogether 174 horses, besides baggage animals.

The *mountain battery* has in peace 5 Officers' horses, 22 draught horses, 6 train horses—total 33; and in war 5 Officers' horses, 135 draught horses, and 66 baggage animals: total 206.

The *horse artillery battery* has in peace 4 Officers' horses, 106 troop horses, 53 draught horses, 6 train horses—total 169; and in war 4 Officers' horses, 107 troop horses, 103 draught horses, 16 train horses, and an uncertain number of baggage animals: total, without baggage animals, 230.

The artillery brigade attached to each Infantry Division is under command of a Major-General, who is, of course, under the orders and the disciplinary control of the Lieut.-General commanding the Division; but he is also responsible for all matters relating to the special arm, as are the commanders of horse artillery batteries attached to Cavalry Divisions to the commander of the artillery of the Army Corps to which the Division belongs. Should the artillery brigade or the batteries not belong to any Army Corps, their commanders are then responsible for artillery matters to the district artillery commandant. In like manner the Officer commanding the Army Corps artillery, though under the immediate command of the General commanding the Army Corps, is also responsible to the Officer commanding the artillery of the Army, if in the field, or to the district artillery commandant, if on home service. The last-named Officer is on the staff of the General commanding the military district, of which there are in Russia 14.

The Commander-in-Chief of the Russian artillery is now the Grand Duke Michael Nicolayewitsch, who is at the head of the artillery department in the Ministry of War.

The artillery belonging to the Russian field army amounts, on the war establishment, to—

	Guns.
Field artillery, attached to infantry divisions	2,392
Horse artillery, attached to cavalry divisions, including Don Cossack batteries	240
Horse artillery in Asia (10 batteries)	60
Don Cossack batteries 8—21, only mobilized in war	84
Total	2,776

If we compare the proportion of artillery to other arms now existing in the Russian Army with that maintained in the German Army, we find in the former 48 field guns per Infantry Division of sixteen battalions, or 16,000 men, *i.e.*, 3 guns per 1,000 men; whilst in the latter we see an Army Corps of two Infantry Divisions (24,000 men) supplied with 96 field guns, over and above the horse artillery, *i.e.*, 4 guns per 1,000 men. On the other hand, the Russian Cavalry Division of sixteen squadrons, with 12 guns, is just as well off for artillery as the German Cavalry Division of twenty-four squadrons, with 18 guns. According to report, however, it is intended ere long to raise the field artillery brigades to the strength of eight batteries, in which case the proportion of field guns to infantry will be the same as in Germany, and it is probable that then also the German custom of permanently separating the corps artillery from the Divisional artillery will be introduced.

The materials of which the *personnel* of the artillery is composed are very good, recruits being selected for it of superior physique and intelligence as far as possible; also those who can read and write, and who have learnt a trade, such as that of smith or carpenter. The horses also are very good, particularly those for draught. The price given for those of the Guard Artillery is about 31*l.*, and for those of the other artillery about 20*l.* Stallions are not taken; and mares only in the proportion of one-third. The regulations as to remounts and casting are almost identical with those in force with the Cavalry; there is, however, only one remount depôt for both Horse and Field Artillery in each military district, except in those of Petersburg and of the Caucasus, where there are two. At each of these depôts there is one Officer, with some assistants, and from 17 to 110 men, according to the number of batteries stationed in the district.

The clothing and equipment of the Field and Garrison Artillery are exactly like those of the Infantry, except that the Guard Artillery wear black velvet collars, and the Line Artillery collars of the same colour as that of the tunic, with red braid. The gunners have the infantry knapsack; but the drivers have the valise. The gunners of field and garrison batteries are armed with a short sabre, hanging to a shoulder-belt; and in war time they all carry the Berdan rifle, though in time of peace only one-fifth of the field battery gunners are thus armed.

Trumpeters, drivers, sergeant-majors, and sergeants carry revolvers as well as the sabre.

As this sabre is inconvenient to the gunners when serving the gun, there is an idea of substituting for it, in their case, a shorter side-arm.

Horse artillerymen are clothed and equipped like Dragoons. All Artillery Officers wear the red sash round the waist. The arms are the same for Horse Artillery as for the field batteries, except that the gunners in the former all carry revolvers. The horse-equipment of all Artillery resembles that of the Cavalry.

In Russia, it is believed that the Field Artillery is equal to that of any other Power, and the Horse Artillery superior to all others, on account, say they, of the excellence of the horses, the lightness of the *matériel*, and the perfection of the training.

Dismounted men of the artillery park are armed with rifles and bayonets.

A field battery carries the following entrenching tools:—16 picks, 16 hatchets, 4 shovels, and 4 crowbars. A mountain battery has 16 shovels, 16 axes, 16 mattocks, 16 picks, and 4 crowbars.

Artillery Matériel.

All field guns are of steel, composed of a wrought tube and a cast jacket. A great many of those now in the service were made by Krupp (pattern 1877), and are almost identical with the German guns (pattern 1873). The

remainder (pattern 1879) were made at the Obukov works, differing from those of Krupp chiefly in the jacket, which is continued right up to the muzzle. The breech-closing apparatus in both is the Krupp cylindro-prismatic wedge. All guns are fitted with the Broadwell ring. The grooves are of uniform size throughout, the twist of the rifling being progressive. The sight is telescopic, similar to that in use in Austria. The guns are coated with black varnish. The old field guns, with which reserve and depôt brigades are at present supplied, are bronze 9 and 4 pounders, of the same calibre as the new steel guns, the breech-closing apparatus being the old flat Krupp wedge.

The horse batteries, both regular and Cossack of Europe and the Caucasus, are armed with the new steel 4-pounder; but some of the other Cossack batteries have the old bronze 4-pounder, carrying the same ammunition as the new guns. The mountain gun is at present of bronze, with a calibre of 2·5 inches, but it will be probably superseded by the Baranowski gun, which is of the same calibre, but of steel; its breech mechanism is like that of the Berdan rifle, and its charge is contained in a metallic cartridge.

RUSSIAN FIELD GUNS.

Pattern 1877.

	Heavy Field.	Light Field.	Horse Artillery.	Mountain.
Metal	Steel	Steel	Steel	Bronze
Calibre	4·2 in.	3·42 ins.	3·42 ins.	2·5 ins.
	cwt. qr.	cwt. qrs. lbs.	cwt. qrs. lbs.	
Weight	12 1	9 0 3	7 0 11	
Length of bore to base of powder-chamber	17·1 calibres	16·9 calibres	15·5 calibres	
Total length of bore	19·7 calibres	23·7 calibres	21·4 calibres	
Number of grooves	24	24	24	12
Twist in calibres	1 in 36	1 in 40	1 in 36	
CHARGES.				
Weight	4 lbs. 1 oz.	2 lbs. 15·8 ozs.	2 lbs. 15·8 ozs.	
Proportion of charge to projectile	$\frac{1}{7}$	$\frac{1}{4\cdot9}$	$\frac{1}{4\cdot9}$	
Initial velocity	1,200 feet	1,450 feet	1,350 feet	
Rotatory speed	95	127	132	
PROJECTILES.				
Weight of loaded shell	27 lbs. 8·6 ozs.	15 lbs. 2 ozs.	15 lbs. 2 ozs.	
Length of shell in calibres	2·6	2·6	2·6	
Weight of bursting charge	14·4 ozs.	7·2 ozs.	7·2 ozs.	
Weight of shrapnel shell	27 lbs. 8·6 ozs.	15 lbs. 2 ozs.	15 lbs. 2 ozs.	
Weight of bursting charge	3·8 ozs.	2·2 ozs.	2·2 ozs.	
Number of balls in shrapnel shell	300	190	190	
Metal of balls	Lead	and anti-	mony.	
Weight of balls	0·42 ozs.	0·42 oz.	0·42 oz.	
Weight of case shot	27 lbs. 1·4 ozs.	16 lbs. 0·5 oz.	16 lbs. 0·5 oz.	
Number of balls in case shot	171	76	76	
Metal of balls	—	Zinc.	—	
Weight of balls	1·73 ozs.	2·24 ozs.	2·24 ozs.	

	Distances.	Elevation.	Angle of Descent.	Remaining Velocity.	Probable Variation.	
					Lateral.	Vertical.
	Mètres.	° ′	° ′	Mètres.	Mètres.	Mètres.
Heavy Field Gun	500	1 7	1 9	343		
	1,000	2 18	2 36	315·90		
	2,000	5 35	6 52	268		
	3,000	9 49	13 16	230·30		
	4,000	15 37	22 3	205·60		
	5,000	22 54	33 8	193·90		
	5,300	25 50	37 30	104·90		
Light Field Gun	500	0 26	0 45	396·90	0·10	0·10
	1,000	1 21	1 44	360·20	0·20	0·30
	2,000	4 2	4 54	301·60	0·63	1
	3,000	7 30	9 39	258	1·50	2·25
	4,000	11 24	15 44	227·60	2·50	4·60
	5,000	13 28	19 18	217·10	3	6·75
	6,000	20 16	32 6	205·80	4·48	19·30
	6,400	22 15	35 14	205	4·80	24·25
Horse Artillery Gun	500	0 39	1 14	374	0·15	0·15
	1,000	1 40	2 42	341	0·40	0·42
	2,000	4 29	6 34	288	1·10	1·28
	3,000	8 9	11 33	245·5	2·50	3·12
	4,000	12 42	17 43	218·5	4·70	6·67
	5,000	17 48	25 25	204·5	8·70	13·15
	6,000	23 20	34 36	201·3	16·40	24
	6,400	25 48	38 40	200·9	19·10	30·20

The powder supplied to the Russian field batteries is composed of 75 parts of saltpetre, 10 of sulphur, and 15 of charcoal. The grain is coarse.

With the exception of case, all projectiles are furnished with two copper rings. The shell is of the kind called annular segment, similar to that in use in the Austrian service for the Uchatius guns, and to the German shell (pattern 1876). In the shrapnel, the bursting charge is in the base of the shell, being separated from the balls by an iron diaphragm. There are now two kinds of shrapnel in use; that approved of, and to be eventually the only one, consisting of an ogival head, connected with the cylindrical part by screws. The case shot is a zinc cylinder, with sheet-iron ends. Both time and percussion fuzes are used; they are both made of metal. In the former, the fuze composition is carried inside the body of the fuze, and the fuze is graduated outside, being ignited by a detonating arrangement. The new pattern fuze burns for 12 seconds.[1] The percussion fuze is on the Prussian

[1] The following remarks are contributed by an experienced Officer:—"There is little difference between the Italian, Austrian, and Russian time-fuzes, all of which are better than the English, in that the composition burns more evenly. The superiority is not so much in the composition as in the system of covering the circular groove containing it with a thin felt, which ensures an even pressure.

principle, with a safety pin, which is ejected by the rotatory motion of the projectile on leaving the muzzle.

The present field gun carriage is built entirely of steel and iron, with wooden wheels. The diameter of the latter is 4′ 6·7″, and the width of track 5′ 5″. The carriages of the field and horse artillery gun are precisely similar, except that the latter has no axletree seats, and carries four instead of two rounds of ammunition in the boxes. The elevating apparatus is that known as the Russian double screw ; it consists of an inner right-handed screw working in an outer left-handed screw, the latter working in a gun-metal socket. The trail is so shaped as to plunge into the soil and thus check the recoil. The strain on the gun is reduced by gutta-percha buffers. The limber-boxes, wagon-bodies, and axletree seats also ride on gutta-percha springs. Each projectile in the limber and wagon boxes is carried in a separate compartment, and the cartridges are packed in leather bags placed in leather cases. The carriage of the mountain gun is of similar construction, except that the elevating-screw is single and works in a gun-metal screw-bed. A pair of shafts can be attached to the trail for draught.

The new iron ammunition wagon consists of a body and limber. Many of the old two-wheeled carts, drawn by three horses abreast, have been converted into wagon bodies by replacing the pole by a perch, and the old cart wheels by limber wheels. All the batteries during the last war, except those of the Guard, had carts, three per gun in heavy and two per gun in light batteries.

At present sixteen ammunition wagons belong to each heavy field battery in war time, twelve to each light, and nine to each horse battery. There are six horses to each gun and wagon in war ; but in peace time light guns and a certain number of wagons are drawn by four horses. The weight of a heavy field-gun ammunition wagon is 46 cwt. 3 qrs. 4 lbs. ; of a light field-gun wagon, 46 cwt. 0 qr. 8 lbs. ; and of a horse artillery wagon 34 cwt. 1 qr., 4 lbs. The gun limbers and ammunition wagons, with their limbers, contain as follows :—

For heavy field gun	....	57	shells,	63	shrapnel,	6	case, of which in
Gun limber	....	7	„	9	„	2	„
For light field gun	....	77	„	82	„	5	„ of which in
Gun limber	....	13	„	15	„	2	„
For horse artillery gun		61	„	60	„	9	„ of which in
Gun limber	....	7	„	10	„	3	„

The store wagon has a hood of waterproof canvas, and is provided with a driver's seat.

The new Russian artillery *matériel* is painted dark green ; the old, of which there is still a good deal in use, light green.

Ranges of Russian Field Guns.

The most effective ranges for shell and shrapnel with the new guns are between 1,200 and 2,800 yards. Shell fire is not supposed to be employed over 7,000 yards ; nor shrapnel fire, with time fuzes, over 3,500 yards. The most effective ranges for the latter species of projectiles are between 1,200 and 2,400 yards, the results being very great against swarms of skirmishers or against bodies of troops, whether exposed or under cover, when, on account of the nature of the ground, the fire of shells with percussion fuzes is inapplicable.

Every time-fuze is made to act as a percussion-fuze at need, so that every shell explodes. The Russians are trying an improvement on the safety-pin principle. The tumbler or hammer is retained in its place by a weak worm to a screw which gives way when the flight of the projectile is arrested. For heavy shells this system answers admirably."

Case shot is used against an enemy at close quarters (from 250 to 300 yards), generally to repel an attack on the battery. If there is no case at hand, shrapnel is substituted with time fuzes set for ·3 of a second, so that the shell may burst about 120 yards from the gun. When a battery first unlimbers it is only supposed to fire one round per gun per minute, but after the range has been found it should keep up the fire at the rate of three rounds per minute.

Recruits appointed to the field batteries are not taught to ride during the first six months; after which the drivers, who are selected from amongst the best men, are instructed in that art, using the snaffle, and are also taught to drive, to harness and unharness, to saddle and pack, and to look after their horses. During the first six months they go through a progressive course of instruction of gymnastics and of foot drill; they are made acquainted with the details of all the *matériel* which they will have to use; they are taught gun drill, sword exercise, &c. In the matter of school work, they are only expected at first to learn how to read and write figures so as to be able to use the range tables. With horse artillery the case is different. The young soldier is taught from the first to ride and to use the sword; in other matters his progress is pretty much the same as with the field-battery man. His riding-school drill is exactly the same as that of the cavalry soldier, and includes the use of the revolver. He has so much to learn that he cannot get through it all, even with the greatest application. As it is, his training as a gunner is rather in arrear.

Instruction is given, as in the other arms, by some of the older soldiers previously selected and trained for the purpose under the personal guidance of an Officer, and under the superintendence of the battery commander. The Division Officers are responsible for interior economy.

The training of the artillerymen in gun-practice is very complete and systematic, both in theory and practice. Every gunner is required to know how to lay a gun, although a certain number of men in each battery are specially told off for that duty with special privileges.

Skill in target-practice is, however, a good deal impaired by the scarcity of good ranges, in consequence of which each battery has to hurry through its course so as to make room for another; and the field firing especially must needs be carried out in a very unreal sort of way, on account of the want of space and of the intimate acquaintance which every one has with the ground. Such being the case, we should beware what construction we put upon the performance of the batteries, which must, under the circumstances, be very delusive. Russian authorities are fully alive to these shortcomings, and the tendency is to make both small and large tactical bodies, after going through their course of drill, pursue their training in such a manner, both in evolutions and in firing, as to make each exercise a real tactical manœuvre, first of all with blank ammunition, afterwards with ball cartridge, varying the ground as much as possible. According to regulation, 246 rounds are allowed annually to each battery for practice, including 128 shell, 108 shrapnel, and 10 case shot.

The following abstract of the report upon the gun-practice carried out in May and June, 1881, on the range at Kijew is instructive :—

Four brigades of field artillery and four batteries of horse artillery were engaged at the same time, that is a total of twenty-eight batteries, or 128 guns, each of the field batteries only turning out four guns.

Each gun fired two loaded shell, two loaded shrapnel, and two case shot *as preliminary practice*, the principal object of which is to make the young soldier acquainted with the properties of the gun and of the different projectiles. The field-firing practice was divided into six exercises, three of which with shell and three with shrapnel. Four of these exercises were devoted specially to firing on earthworks.

One exercise was given up to firing at moving and disappearing targets, in which the great accuracy of the new gun showed itself. The exercises were closed, as they always are, by an inspection on the part of the General commanding the military district, on which occasion an extra allowance of 16 shell and 16 shrapnel per battery is sanctioned. Only a certain number of the batteries present could take part in the gun-practice at this inspection, for want of time. On this occasion a tactical idea was worked out. The targets represented two chains of skirmishers with reserves, three four-gun batteries, and two parties of cavalry, each target being 9 feet high and 60 feet long, one behind another at a distance of 30 paces. Each battery was provided with 35 shell and 24 shrapnel; 8 shell being allowed for finding the range, distances being unknown. There were three separate heats, two batteries being engaged in each. In the first heat, the firing was with shrapnel against a chain of skirmishers, a field battery getting the range (2,100 yards) at the sixth shot. The average of hits was sixteen to every shot. This result is, in Russian official language, "more than very good." A horse battery, which fi[illegible] on the same mark, got the range at the fifth shot; but its practice was rec[illegible]ded only as "more than middling," as it put in but 5½ hits per shot. Russian horse artillery, be it remarked, is generally inferior in gun-practice to field artillery. In the second heat, the mark was a battery; the projectile shell. A heavy battery got the range at the ninth shot, and at 2,473 yards made 400 hits—more than 16 hits per shot; a result described as "more than very good." A light field battery got the range also in nine shots, and at the distance of 2,520 yards made 21 hits per shot, receiving equally high praise. In the third heat, a horse battery fired on artillery with shell, finding the range (1,540 yards) at the seventh shot; 509 hits, or 21 per shot.

A Don Cossack battery fired with shrapnel, range 1,490 yards; hits, 1,136, or 47 per shot.

In the last two cases the verdict was, as in all the former but one, "more than very good."

The seven Cossack batteries of the first category, be it remarked, are in every way as well turned out and trained as the "regular" artillery, to which they yield in nothing. The Don batteries of the other categories also keep four guns constantly horsed, and go through an annual course of training which lasts several weeks.

After the field-firing came the prize shooting, in which the "leading gunners" (No. 1) competed. This was followed by the prize driving. About 4*l.* 19*s.* per battery is allowed annually for these two competitions.

Field-firing is carried on in the same manner on the other ranges, special attention being everywhere paid to shrapnel fire, which is much valued in Russia.

The Drill and Tactics of Artillery.

The battery is, as everywhere else, the smallest tactical unit. The field battery has eight guns in war; four guns in peace. The horse battery has at all times six guns. The eight-gun battery is divided into half-batteries, each under its special commander. Each pair of guns, commencing from the right, form a division under an Officer. A mounted non-commissioned officer has special charge of each gun. Six men compose the detachment for a light field gun, and seven men for a heavy field gun. Nine men are allotted to each horse artillery gun, of whom three are horse-keepers. Gun drill is pretty much the same as elsewhere.

Each wagon has a non-commissioned officer in charge, two gunners, and three drivers. When the gun is unlimbered, the limber is kept twenty paces behind it, with the horses' heads towards the enemy. When the battery is in action, non-commissioned officers in charge of guns are posted with the limber, immediately in front of the leading pair of horses.

When the gun is limbered up, the gun detachment falls in, according to circumstances, either on one or on both sides of the gun. The recognized rates of speed are, for field guns, 125 paces in the minute at the walk, 300 at the trot. The gallop is only allowed exceptionally with field guns; but with horse artillery it is one of the recognized paces, the rate being 600 paces per minute.

When rapid movement is continued for any length of time the gunners are seated, two on the gun-carriage, three on the limber, the remainder on the wagons. The battery may be formed in line, or may break into column from either flank or from the centre, either by single guns (sub-divisions) by divisions, or by half-batteries. When a battery is in line, the interval between guns is 27 paces, or 12, or 6.

The battery commander posts himself 25 paces in front of the centre; the half-battery leaders 10 paces in front of their respective half-batteries; the third and fourth Officers 4 paces in front of the flank divisions; the fifth Officer with the wagons; sergeant-major in rear of the line. When the battery consists of only four or of six guns, the senior subalterns lead divisions, and the third or fourth Officer goes to the wagons. When in action, the commander is 8 paces in rear of the line, half-battery leaders 4 paces, and division leaders 2 paces.

Columns are either open or close, *i.e.*, with 6 paces distance. Officers are posted in the first case as in line, in the second case on the pivot flank. All movements and firings are executed at the word of the half-battery and division leaders, after the battery commander has given the caution; but the guns are not put in motion until the commander gives a signal with his sword. When the battery is in line, the centre directs; when in column, it moves by the right, unless otherwise ordered. Non-commissioned officers in charge of guns are responsible for pace and direction, drivers having only to follow them, and looking straight to their front, except in marching past, when they glance to the right on passing the saluting point. Column formations and deployments are generally on the centre. When the battery is in action, the commander sheaths his sword, and goes wherever his presence is required. The other Officers may dismount to regulate the firing. Non-commissioned officers in charge of guns, drivers, and horse-keepers also dismount.

The rules for loading and firing, either by salvoes or by successive guns or divisions, appear to be the same as with us.

The battery, when in action, is to change its position as seldom as possible—a rule which appears to be recognized in all armies. When a change of position is necessary, the battery commander rides on with his trumpeter and places himself where the centre of his battery will be. Non-commissioned officers in charge, in the case of field-guns, No. 6 in the case of horse artillery, gallop out and act as markers, dismounting till the battery approaches. The battery may also advance or retire in échelon of half-batteries. In executing such movements, as well as all others under fire, field batteries move at a trot, with gunners seated; but horse artillery may, if it be advisable, gallop. The movement may be covered by the fire of the halted échelon.

Ammunition wagons remain 50 paces in rear of the battery when in line, and form, when manœuvring, a separate échelon, composed of two divisions, each of two wagons under an Officer, whose duty it is to conform to the movements of the battery, keeping as near to it as prudent when advancing, and always before it when retiring, and in taking ground to a flank moving as far as possible on a level with the centre guns. Sometimes, when the fire is very rapid, it becomes necessary to take wagons up to the very gun-limbers.

The second échelon of wagons, which has to feed the first échelon, not only with ammunition but also with men and horses, follows the battery at a distance of from 1,200 to 1,500 paces, and completes itself from the corresponding section of the "flying park," which, when an action is impending,

naturally approaches as close as possible, but at other times remains usually one or two marches in rear of the army. This "flying park" carries 108 rounds for each heavy and 116 for each light field gun, whilst the "field parks" follow two or three marches further to the rear, conveying 36 or 43 rounds per gun (according to calibre). Again, three or four marches further back are the main depôts, with 250 rounds per gun.

The total provision of gun ammunition is therefore as follows :—

For heavy field guns	....	....	....	520 rounds per gun.
For light field guns	....	....	....	573 „
For horse artillery guns	....	....	....	539 „

The Movements of a Combined Force of several Batteries.

When two or more batteries are in line deployed, they preserve an interval of 30 paces.

When in line of battery columns, these must always be close columns, though the intervals between the batteries may be more or less full.

A line of contiguous battery columns is formed with intervals of 30 paces between the batteries when these are in columns of half-batteries, with intervals of 80 paces when the batteries are in columns of divisions, the columns being in each case close, but with full interval between guns. When all the batteries form one general column, whether of half-batteries, divisions, or subdivisions, the distances may vary at pleasure between "close" and "open;" but if the column is of batteries, it is always a close column. When the column is of half-batteries, the full distance between batteries is 80 paces; when of divisions or subdivisions, 30 paces; in close column the distance is always 20 paces. Ammunition wagons are, as a rule, behind all the batteries when in close column, and on the flank of their own battery when in open column. The commander of the whole line posts himself with his staff and trumpeter 100 paces in front, or, if in action, in rear, and when taking ground to a flank, opposite the centre, at 100 paces distance. When in action, he of course is at liberty to go where most required. A line of several batteries marches by its centre, unless otherwise ordered. The evolutions of many batteries in combination are much practised, in view of the necessity of massing artillery in action now generally recognized.

The Action of Artillery in Combination with the other Arms.

The German principle is acted upon, of keeping a considerable force of artillery well to the front in column of route as well as in order of battle, so that it may serve to cover the deployment of the other arms from the very commencement of the action. In all cases, however, a portion of the guns will be held in reserve for use at critical moments. Artillery once in action will be relieved only under very exceptional circumstances, and then only together with the other troops in position. A battery will not even be withdrawn if it has fired away all its ammunition. The commander of a body of artillery, small or great, when acting with other troops, as will generally be the case, should not be hampered by minute instructions from the Officer commanding the whole force, but should only receive general directions, which he should have considerable latitude in carrying out.

We may here remark that the question of how far independence of action is permissible to an artillery Officer has for some time, and still is, hotly discussed by Russian military writers. The question has by no means been decided, even by the authoritative enunciation of the principle just stated. The action of Russian artillery in the last war was by no means always

satisfactory--a fact which was made use of both by those who wish to give artillery greater freedom of action, and by those who, on the contrary, desire to limit this freedom, each party in support of its own views; the artillerymen complaining that the commanders under whom they served were too often unacquainted with the powers and peculiarities of artillery, dispersing it too much and preventing its effective action; Infantry Officers, on the other hand, maintaining that even in peace time the "gunners" are inclined to look upon themselves as a privileged caste, with greater knowledge than their comrades of the other arms, which feeling leads them in war to aim at emancipating themselves from the control of superior Officers not belonging to their own branch of the Service—a tendency all the more hurtful because the Artillery Officer is, say these objectors, as a rule, too much occupied with the merely technical points of his duties to make himself well acquainted with the tactics of the three arms. The latter party, which is not confined to Infantry Officers, but includes some noted artillerymen, proposes, in accordance with the views just expressed, that artillery, instead of being, as now, under the Divisional or Army-Corps commanders merely for purposes of discipline, whilst under the superior Officers of its own arm for all technical matters, should in future be placed entirely under the General commanding the Division, who would have on his staff an Artillery Officer as adviser. The more moderate section of the other party takes an exactly opposite view with regard to the position of artillery in peace time, and claims for it a degree of independence equal to that accorded to the Engineers, admitting, however, the necessity of its subordination to higher authority in war. The extremists go a long way further, and claim for the arm entire independence of action both in peace and war, as by such alone, say they, can you arrive at the combined action of batteries in large masses, after the modern fashion, at the right moment without undue wear and tear of *matériel*.

It seems probable that the present system, that of the divided command of artillery in peace time, while in war the whole control remains with the Officer commanding the body of troops, of which the artillery form part, will be maintained.[1] The new regulations upon the training of the Army will moreover give both artillery and infantry much greater opportunity of becoming acquainted with the tactics of each other's arm and of working in unison.

There seems to be less difficulty with regard to the relations between cavalry and horse artillery than with regard to those between field batteries and infantry.

Garrison Artillery.

It is intended to form eventually fifty garrison artillery battalions for serving the siege guns in the fifteen European fortresses and in Alexandropol (Caucasus). Each battalion will consist of four companies, with a total establishment of 1,200 men in war and of 400 men in peace. As yet, however, only forty-one battalions have been organized, six of which have as yet only three companies. The following table gives in Column I the name of each fortress supplied with garrison artillery; Column II gives the number of battalions now existing in each place; Column III the number contemplated:

[1] Since the above was written we have learned from the "Revue Militaire de l'Étranger," No. 565, that the divided command of artillery, even in peace-time, no longer exists, the field batteries forming part of army corps being placed entirely under the General Officer commanding the corps.

I.		II.		III.
Kronstadt		6	....	6
Wyborg		2	....	3
Sweaborg		2	....	2
Dünamünde		1	....	1
Dünaburg		4	....	4
Bobruysk		1	....	1
Warsaw		2	....	3
Novogeorgiewsk....		5	....	7
Brest-Litowsk		3	....	4
Ivangorod		2	....	3
Kijew		3	....	4
Nicholajewsk		3	....	3
Bender		1	....	1
Kertch		3	....	5
Alexandropol		3	....	3
Total		41	....	50

In addition to these battalions, eleven garrison artillery companies are maintained, two of which are at St. Petersburg, and the remainder at various posts in Asia. Garrison artillery matters are under a special committee in every fortress. The gunners are armed with rifles, and go through the whole of the infantry drill and instruction, including rifle practice. There is target practice with siege guns, and special manœuvres, especially siege operations, take place annually for the instruction of the garrison artillery. There is a special programme for the training of Officers, both in winter and in summer, calculated so as to extend their knowledge of the attack and defence of fortresses.

The "Revue Militaire," No. 567, states that the Artillery Committee of Alexandropol is to be removed to Kars, and that one of the battalions of artillery now in the former fortress on the war footing is to be converted into three battalions on the peace footing, the five battalions thus formed out of the three now existing being divided between Alexandropol and Kars, with depôts at Michailovsk on the Caspian and at Poti; these measures to take effect from 13th January, 1883.

SIEGE GUNS, GUNS OF POSITION, AND GUNS FOR COAST DEFENCES.

RIFLED GUNS.

Breech-loaders.

Cast-steel hooped guns for coast defence (14″, 11″, 9″, 8″, 6·03″, and 6″); light 8″ steel-hooped guns; 30-pr. cast-iron guns; long 24-pr. steel, bronze, and cast-iron guns; light 24-pr.; light 12-pr.

Muzzle-loaders.

24-pr. steel and cast iron; 12-pr. steel, bronze, and cast iron; 12-pr. and 9-pr. field guns (pattern 1861).

RIFLED MORTARS.

Breech-loaders.

Cast-steel hooped mortar for coast defence (11″ and 9″); 8″ cast-steel hooped mortar; 8″ bronze and cast-iron mortar; 6″ bronze mortar.

Muzzle-loaders.

6″ mortar, bronze.

SMOOTH-BORE GUNS.

10·75″ cast-iron shell guns; 60-pr. cast-iron guns; 69-pr. cast-iron carronades; 36-pr. cast-iron carronades; 24-pr. cast-iron carronades; long 7·07″ cast-iron howitzers; light 7·07″ cast-iron howitzers; 6·02″ cast-iron howitzers.

RIFLED GUNS. (From "Armed Strength.")

	11-in. steel	9-in. steel.	8-in. steel.	Light 8-in. steel. Pattern 1873.	6-in. steel. Coast defence.	Long steel 24-pr.	Light bronze 24-pr. Pattern 1872.	12-pr. cast-iron. Pattern 1867.
	T. cwt. qr.	T. cwt. qr. lb.	T. cwt. qr. lb.	T. cwt. qr. lb.	T. cwt. qr. lb.	T. cwt. qr. lb.	T. cwt. qr. lb.	T. cwt. qr. lb.
Weight of Gun, including breech-pin	27 11 1	14 10 1 16	8 16 0 21	5 16 2 25	4 3 3 13	3 1 1 2	1 8 1 16	1 9 0 2
Weight of segment shell	562 lb.	276 lb.	179 lb.	—	96 lb.	—	—	—
,, common shell (loaded)	494 ,,	280 ,,	172 ,,	172 lb.	81 ,,	64 lb.	64 lb.	32·5 lb.
,, shrapnel shell (loaded)	—	—	—	—	—	79 ,,	79 ,,	37 ,,
Greatest powder charge	82·7 lb.	46·3 lb.	30 lb.	19·4 lb.	18·1 lb.	19·9 ,,	6·2 ,,	2·3 ,,
Initial velocity of common shell	1,286′	1,339′	1,385′	1,024′	1,342′	1,575′	1,063′	879′
Penetration of iron plates at 1,000 mètres	9·5″	6·5″	4·9″	—	4·3″	—	—	—

RIFLED MORTARS.

	11-in. steel.	9-in. steel.	8-in. steel. Pattern 1870.	6-in. bronze. Pattern 1867.
	T. cwt. qr. lb.	T. cwt. qr. lb.	T. cwt. qr. lb.	T. cwt. qr. lb.
Weight of Gun, including breech-pin	10 5 1 10	4 19 2 16	3 2 0 27	1 10 3 24
Weight of common shell, loaded....	494 lb.	280 lb.	172 lb.	81 lb.
Greatest powder charge	—	—	14·4 ,,	5·4 ,,
Initial velocity of common shell	—	—	797′	722′

Smooth-bore Mortars.

13·02″ cast-iron mortars; 9·23″ cast-iron mortars; 6·02″ bronze mortars; 6-pr. bronze mortars; 3-pr. bronze mortars.

Machine Guns.

The old Gatlings last used by Russians in the field against the Tekhé Turcomans in 1881 are now to be kept solely for the defence of ditches. They have ten barrels, and fire the Berdan ammunition. Palm Krantz mitrailleuses have also been lately adopted: that for land service (fortress) fires from 800 to 1,400 rounds a minute; that for sea service has a larger calibre, and can fire up to 3,000 rounds a minute.

Screw Guns.

A screw siege gun and mortar have been introduced. The former has a calibre of 8″, and the latter of 9″. Forty of these have been ordered, with 500 rounds per gun.

Wall Pieces.

The Krinka wall piece has a calibre of ·797″. It fires a ball weighing 4 oz. 5·2 drs., and the powder charge is 4·44 drs.; initial velocity, 1,408′; weight of piece, 45 lbs.

Siege Artillery.

Siege guns are worked by detachments from the garrison artillery. There are three siege trains, including that belonging to the army of the Caucasus. Each train is divided into twelve sections, except that of the Caucasus, which is composed of ten. The siege train consists chiefly of hooped guns, weighing 4 tons, with an initial velocity of about 1,500′; of short bronze pieces of two tons weight, with an initial velocity of 700′; of bronze guns of 15 cwt.; of 8-inch rifled steel mortars, weighing four tons; of 6-inch rifled bronze mortars; and of 20-pr. smooth-bore bronze mortars, in the following proportion:—Of the 4-ton guns, 50 per cent.; of the 15-cwt. guns, 20 per cent.; and of the remainder, 30 per cent.

Field Parks and Ammunition Depôts.

The field artillery parks serve in war to keep up the supply of ammunition for the troops, and are kept both during peace and war divided into two branches—one to supply ammunition to infantry and field artillery, the other to do the same for cavalry, horse artillery, and rifle battalions. The parks are again distinguished as "flying" and "mobile." There is one of the former for each Division, subdivided into three artillery sections and two infantry sections, with 130 four-wheeled wagons. These form the first line. The second line of wagons, which feeds the first, consists of the "mobile" parks, thirteen in number, each of four sections. There are twenty-one sections of the "flying" park, each with twenty-four 4-horse wagons, for the use of the cavalry; and seven of the same, each of sixteen wagons, for that of the rifle battalions. In time of peace, these cavalry and rifle sections are amalgamated, and the cadres are maintained, whilst neither men nor horses are kept for the other parks, the material being in store and ready for use.

A *siege park* contains, according to regulation, besides all the other material, 400 guns; but this number may be increased or diminished, according to the requirements. Six battalions of garrison artillery are allotted to a park. The three siege parks are always kept complete in point of *matériel*, but not in point of *personnel*, during peace only a sufficient number of Officers and men being attached to them to keep everything in good order.

The *advanced artillery depôt* of the Army serves to keep the different artillery units complete in men, horses, and *matériel*, ammunition excepted. Its strength depends upon circumstances.

The *ordnance magazines* supply the field parks of the Army.

The *provisional magazines of small arms* are intended for the safe keeping and repair of small arms, which are stored at certain points until an opportunity offers for despatching them to the front.

The *movable artillery and laboratory establishments* serve for such repairs of the *matériel* connected with fire-arms as cannot be executed by the regimental artificers.

Technical Establishments for Artillery Purposes.

There are three *manufactories of small arms*—at Tula, at Ischewsk, and at Sestroretzk.

A *cartridge-factory* at Petersburg, where all parts of the cartridge are made except the powder.

Three *powder-factories*—at Ochta, Michailowsk-Schostensk, and Kasan.

Arsenals at Petersburg, Brjansk, Perm[1], and Kijew, for the repair of bronze guns, carriages, limbers, wagons, &c.

A *rocket-factory* in the Chersonese.

An *arsenal and laboratory* in Turkestan.

A *cartridge-case factory* at Moscow.

District arsenals, with laboratories, in the different military districts (in some, indeed, more than one) for storage and maintenance of artillery *matériel*, small arms, and ammunition.

Artillery ranges in eight of the military districts for gun-practice, for training Officers and non-commissioned officers, and for carrying on experiments. The principal of these stations is at Ochta, where there is a special arsenal, and a detachment of 150 men who are employed in experimentalizing on all matters connected with artillery *matériel*, under special superintendence of the President of the Artillery Committee.

A *pyrotechnical school.*

A *technical school.*

The technical schools-of-arms at Tula and at Ischewsk for the training of artillery sergeant-majors, draughtsmen, &c.

Engineers.[2]

The Engineers are formed in five brigades, four of which belong to European Russia and one to the Caucasus. In each of the European brigades there are three sapper battalions, one railway battalion, two half-battalions of pontoniers, one field-engineer train, and two telegraph trains. The second and third brigades are, in addition, supplied with an engineer siege train. The Engineer Brigade of the Caucasus has only three sapper battalions, one field engineer train, and one telegraph train. In peace time, every sapper

[1] All field guns, and also 6″ guns, are made at Perm, and at the Oboukoff works at St. Petersburg. 11″ guns are also made at the latter, and indeed at Perm also, but many made at the latter place have failed from the metal being too brittle.

[2] Since the above was printed a considerable augmentation has been made to the Engineers, together with some changes in organization. There are now (July, 1883) five brigades in Europe and one in the Caucasus; the former consisting each of three battalions of sappers, two pontoon half-battalions (except the first and fifth brigades, which will each have only one), one railway battalion, three field telegraph trains with 195 versts of wire, and one field engineer train. The second and third brigades have also, as before, each an engineer siege train. There are besides altogether four companies of miners and one galvanic company. The Caucasian brigade consists of two battalions of sappers, one telegraph train, and one field engineer train. In time of war there will be an addition of thirty reserve companies of sappers and four depôt battalions in Europe, and of four reserve companies in the Caucasus.

battalion has five companies, one of which becomes the depôt on mobilization. The field sapper battalion has thus only four companies. The pontonier half-battalion has only two companies. The railway battalions consist of four companies—two for constructing, and two for working railways. The field engineer train conveys entrenching tools and other necessaries for field-fortification. It consists of three sections, each of which is divided into four divisions. Each pontoon train carries materials for the construction of a bridge 700 feet in length.

The *engineer siege train* conveys all the requisites for siege operations. It is divided into four sections, each complete in itself, with all engineer materials necessary for the siege of a fortress. In peace time, all tools and other stores are held in readiness; also a baggage train, consisting of twenty-four wagons and four field forges. Horses are not kept in peace time. Each engineer siege train has a so-called Park Company attached to it.

The *field telegraph train* is maintained for the purpose of establishing telegraphic communication between the several portions of an Army, and between each of these and head-quarters. Each train carries the materials for establishing a telegraph line 195 versts (130 miles) in length, with implements for six stations. The train is provided in war time with 6 station wagons, for apparatus, batteries, &c.; 3 wagons for provisions; 21 six-horse wagons for carrying materials, with accommodation for fourteen men each; 3 four-horse wagons, for reserve material and accommodation for ten men each. There are twelve spare horses.

Establishment of a Sapper Field Battalion.

OFFICERS.

Peace.		War.	
Colonel as Commandant	1	Colonel as Commandant	1
Lieutenant-Colonel	1	Lieutenant-Colonel	1
Captains	2	Captains	2
Staff Captains	2	Staff Captains	2
Subalterns	14	Subalterns	11
Total	20	Total	17

NON-COMMISSIONED OFFICERS AND MEN.

Sergeant-Majors	5	Sergeant-Majors	4
Quartermaster-Sergeants	7	Quartermaster-Sergeants	6
Sergeants	21	Sergeants	17
Corporals	40	Corporals	58
Drummers	11	Drummers	9
Bugler	1	Bugler	1
Lance-Corporals	80	Lance-Corporals	80
Privates	520	Privates	780
Volunteers	10	Volunteers	8
Total	695	Total	963
Grand Total Combatants	715	Grand Total Combatants	980
Administrative Officials	3	Administrative Officials	3
Workmen, Drivers, &c.	35	Workmen, Drivers, &c.	50
Horses	16	Horses	98

Establishment of a Pontoon Half-Battalion.

OFFICERS.

Peace.		War.	
Commandant (Colonel)	1	Commandant (Colonel)	1
Captain (for administration)	1	Captain (for administration)	1
Adjutant (Captain)	1	Adjutant (Captain)	1
Paymaster, Quartermaster, and Arms Officer (Subaltern)	1	Paymaster, Quartermaster, and Arms Officer (Subaltern)	1
Captains Commanding Companies	2	Captains Commanding Companies	2
Subalterns	6	Subalterns	6
Total Officers	12	Total Officers	12

NON-COMMISSIONED OFFICERS AND MEN.

Battalion Quartermaster Sergeants	2	Battalion Quartermaster Sergeants	2
Company Sergeant-Majors	2	Company Sergeant-Majors	2
„ Quartermaster - Sergeants	2	„ Quartermaster - Sergeants	2
N.-C. Officers (1st Class, Sergeants)	8	N.-C. Officers (1st Class, Sergeants)....	8
N.-C. Officers (2nd Class, Corporals)	16	N.-C. Officers (2nd Class, Corporals)	32
Volunteers	4	Volunteers	4
Battalion Trumpeter (Mounted)	1	Battalion Trumpeter (Mounted)	1
Drummers	4	Drummers	4
Lance-Corporals	32	Lance-Corporals	32
Privates	230	Privates	300
Total N.-C. Officers and Men	301	Total N.-C. Officers and Men	387

Non-Combatants.

OFFICERS.

Junior Surgeon	1	Junior Surgeon	1
Veterinary Surgeon	0	Veterinary Surgeon	1
Accountant	1	Accountant	1

NON-COMMISSIONED OFFICERS AND MEN.

Clerks	5	Clerks	5
Hospital Sergeants	4	Hospital Sergeants	4
„ Pupils	2	„ Pupils....	0
Farrier Sergeants	0	Farrier Sergeants	2
Hospital Orderlies	2	Hospital Orderlies	2
Master Armourer	1	Master Armourer	1
Tradesmen and Artificers	11	Tradesmen and Artificers	20
Cutter-out	1	Cutter-out	1
For the Baggage Train—		For the Baggage Train—	
1 N.-C. Officer, 3 privates	4	1 N.-C. Officer, 9 privates	10
For the Pontoon Train—		For the Pontoon Train—	
Sergeant-Majors	0	Sergeant-Majors	4
Sergeants	0	Sergeants	8
Lance-Corporals	0	Lance-Corporals	16
Privates	0	Privates	116

Total Non-Combatants.

	Peace.	War.
Officers	2	3
Non-commissioned Officers and Men	30	185

Establishment of a Railway Battalion.

Officers.		Non-commissioned Officers and Men.	
Commandant (Colonel)	1	Battalion Staff	4
Battalion Staff	7	Company N.-C. Officers	80
Commanders of Companies	4	Volunteers	8
Subalterns	12	Lance-Corporals	80
		Drummers, &c.	10
		Privates	820
Total Officers	24	Total N.-C. Officers and Men	1,002

Non-Combatants.

Officers.		Non-commissioned Officers and Men.	
Battalion Staff	3	Battalion Staff	43

Establishment of a Field Telegraph Train.

Peace.		War.	
Commandant (Lieut.-Col.)	1	Commandant (Lieut.-Col.)	1
Captains	3	Captains	3
Lieutenant (including the Adjutant)	1	Lieutenants (including the Adjutant)....	2
Sub-Lieutenants	2	Sub-Lieutenants	2
Sergeant-Major	1	Sergeant-Major	1
Telegraphists	24	Telegraphists	24
Mechanicians	6	Mechanicians	6
N.-C. Officers (1st Class, Sergeants)	0	N.-C. Officers (1st Class, Sergeants)	12
N.-C. Officer (2nd Class, Corporal)	1	N.-C. Officers (2nd Class, Corporals)....	24
Lance-Corporals	3	Lance-Corporals	36
Privates	40	Privates	191
Total	82	Total	302

Establishment of a Field Engineer Train.

Peace.		War.	
Commandant (Lieut.-Col.)	1	Commandant (Lieut.-Col.)	1
Officers	3	Officers	7
Non-commissioned Officers	5	Non-commissioned Officers	17
Lance-Corporals	6	Lance-Corporals....	8
Privates	42	Privates	97
Non-Combatants	6	Non-Combatants	140
Total	63	Total	270
Horses	0	Horses	280

Establishment of a Siege Engineer Train.

Peace.		War.	
Commandant (Field Officer)	1	Commandant (Field Officer)	1
Other Officers	1	Other Officers	11
Non-commissioned Officers	2	Non-commissioned Officers	20
Drummers	0	Drummers	4
Lance-Corporals	0	Lance-Corporals....	60
Privates	0	Privates	140
Total, all ranks	4	Total, all ranks	236
Non-Combatants	38	Non-Combatants	32
Horses	0	Horses	387

Engineers.

The materials of which the Engineer troops are composed are particularly fit for the special services to which they are destined. Artisans of all kinds and mountaineers are selected. The pontoniers are particularly good, being recruited from boatmen, fishermen, and such like.

No recruit is taken for the Engineers under 5 ft. 1¼ in., and unless broad shouldered. The Emperor Nicholas thought a great deal of this arm of the Service, and raised it nearly to a level with the Guard—a position which it has since maintained. The uniform resembles that of the Artillery, only with white-metal braid and buttons.

The Engineers of the Guard have black velvet facings, collar, cuffs, and cap-band; the Officers being distinguished by silver embroidery. Engineers of the line have dark green piping, and their Officers have a silver band to the collar; shoulder-straps red, with the battalion number upon them. Linen blouses are worn by working parties; black belts.

Arms and equipment the same as those of Infantry, except that they carry the shorter dragoon rifle and bayonet.

Non-commissioned officers and privates of the Engineer Field Train, also mounted non-commissioned officers and drivers of the pontoon train, wear short dragoon swords; non-commisioned officers being, moreover, provided with revolvers.

Working and Entrenching Tools.

All drivers of the pontoon train, as well as privates of the field and siege parks, are furnished with hatchets on mobilization. Each company of the sapper battalions carries with it, on the men's persons, 104 spades, 72 hatchets, 10 shovels, 20 mattocks, 8 hammers, 4 tracing lines, and 2 chisels; having in reserve 40 spades, 24 small axes, 16 broad axes, 5 shovels, 5 mattocks, 8 hammers, 6 crowbars, 4 fascine knives, 1 fascine choker, 2 rail-spanners, 2 grindstones, complete, 100 sand-bags.

Pontoon and miners' companies carry about the same supply of tools. The engineer train transports the reserve tools, each sapper battalion having attached to it 8 wagons for implements, with 32 horses; each pontoon battalion 58 pontoon wagons, with 372 horses and 24 spare horses; whilst the railway battalion has 4 wagons for tools and material, 2 wagons for explosives, and 29 horses. In peace time, five sapper battalions are provided with the whole engineering *matériel* and transport for four companies; but for one company, only with the tools carried by the men. The other sapper battalions are complete with material and transport for six companies.

In time of war all active sapper battalions and reserve companies are

complete in every way. Depôt battalions have only the tools carried by the men.

The dimensions, &c., of Russian pontoons are as follows :—End sections, 14 ft. 1 in. long, 6 ft. 2¾ in. wide, 2 ft. 5 in. deep, weight 758 lbs., buoyancy 10,364 lbs. ; middle sections, 11 ft. 5½ in. long, 6 ft. 2¾ in. wide, 2 ft. 5 in. deep, weight 722 lbs., buoyancy 9,967 lbs.

From the materials of a whole pontoon park may be formed a bridge 340 to 400 yards long for infantry, cavalry, and field artillery, with four baulks in a bay ; 300 to 315 yards long, for the same, and train with five baulks in a bay ; 233 to 266 yards long, for siege artillery, with six baulks in a bay. The time occupied in bridging an ordinary stream, under favourable conditions, by the whole park is,—by running out, two hours ; by bays, one hour ; and by swinging, half an hour.

Drill Regulations and Training.

Apart from the technical work, engineer troops are drilled and trained just like infantry. The sappers especially distinguish themselves by the manner in which they perform field evolutions, often surpassing infantry battalions in steadiness and finish. Neither are they behindhand in shooting or in field duties. This is to be accounted for by the goodness of the materials of which the engineer troops are composed, and also by the fact that a large proportion of the sapper Officers come from the infantry—a circumstance which may possibly have a bad effect on the efficiency of the corps to which they are transferred in its own special duties, although such a result is hardly to be noticed. The tendency at present is to reduce the amount of infantry drill in the engineer battalions. We shall have occasion to notice, in our remarks upon the new system of instruction for the Army generally, how that of the engineers is conducted with regard to distribution of time, and with regard to the share taken by them in the summer exercises of all arms combined. Hitherto engineer troops have been kept much to themselves, and have been brought but little into connection with the other arms of the Service ; but this separation is gradually becoming less and less marked, as the importance of the assistance given by the engineers to other troops in the field is more and more realized, in view of the necessity of obtaining artificial shelter from fire. The new instructions for the construction of shelter-trenches by infantry and cavalry require so much technical knowledge on the part of Officers and men thus employed, as to render it desirable that on such occasions they should be under engineer superintendence—a circumstance which is borne in mind and acted upon even at the summer exercises of all arms. To show how much importance is attached to the construction of field works, we may mention that a reserve supply of tools (in addition to those carried by the men) is now transported by infantry, cavalry, and artillery in the proportion of 10 spades, 24 hatchets, and 3 mattocks per company, 8 spades and 8 hatchets per squadron, and 16 spades and 16 hatchets per battery.

Technical Questions.

Engineer officers are apt to look with a slight degree of contempt and mistrust at what they consider the amateur performances of the other arms in the work of the sapper, and complain that too much importance is attached to rapidity of construction at the expense of solidity and of proper shelter. Experiments made at the sapper camp of Ust-Ischora proved, according to the official account, that parapets, one foot thick at the crest,[1] are a complete protection from rifle fire, but not against splinters of shell. To give fair shelter against the last-named projectile the parapet must be two feet thick at the crest, and no more, so that the shell may break through and burst well in

[1] The nature of the soil is not stated.

rear; whereas, if the parapet were from four to eight feet thick, the shell would either burst in it, or immediately after passing through it, to the great damage of the defenders. A thickness at the crest of fourteen feet is looked upon as the minimum for absolute protection against shell fire, though this is evidently not attainable with hasty field entrenchments. Loopholes lined with gabions are condemned, as not offering sufficient resistance.

Ditches of triangular profile are not approved of, on account of the difficulties of construction. Entrenchments should be made in a thoroughly methodical manner, every step in the process by distinct word of command, just as in field exercise, so as to ensure greater completeness of execution. Works intended to cover guns should, if possible, be provided with "bonnets," and be half sunken.

Practice was made against a field redoubt provided with traverses and splinter-proofs, the result thereof seeming to show that a garrison thus sheltered would suffer little. The engineers, therefore, are much impressed by the value of field works, even against the improved artillery of the present day. It is not anticipated that the introduction, which seems probable, of light field mortars will much affect shelter-trenches; but their effect on closed works is dreaded, and it is thought advisable to make such works of small dimensions in view of this danger. Experiments are now being made in this direction.[1]

At the summer exercises in the practical work of the sapper and pontonier, practice of this nature is combined with tactical manœuvres, representing the attack and defence of positions, the passage of rivers, and so forth. The technical instruction of *railway battalions* and of men belonging to the *telegraph train* is in its infancy, but it is intended to be conducted on the German system. All the latest appliances, such as heliographs, optical signals, and telephones, have been introduced. Theoretical instruction is given very thoroughly in the battalion and brigade schools, the former intended to fit privates for the post of non-commissioned officer, the latter to impart technical training of a superior quality to the non-commissioned officer. There are also special courses for instruction in firing mines by electricity. The course lasts two years in the battalion schools (in connection with which are also company schools), being divided into an upper and a lower term; but in brigade schools it only lasts one year, and the same applies to the mining course.

Officers and non-commissioned officers belonging to the corps act as instructors. The course in the battalion schools comprises the Russian language, arithmetic, geometry, fortification, artillery, drawing, army organization, and carpentry.

The same subjects are taught in brigade schools, but up to a higher standard. During the season of summer exercises, the scholars rejoin their several corps. There are annual examinations. Men who pass through the battalion schools with credit, and are in other respects deserving, are promoted to the first vacancies. The non-commissioned officers who have most distinguished themselves in the brigade schools receive the higher pay of a "conductor of the second class." The same allowance is given to the instructors and to the best scholars in battalion schools.

Officers of Engineers are divided into three classes: 1. *Military Engineers*, employed in the higher duties of the department; 2. *Local Engineers*, who direct and superintend military buildings; 3. Officers attached to sapper battalions and other bodies of engineer troops.

[1] The foregoing is an epitome of the views which Russian engineers are said, by Lieut. von Drygalski, to entertain on some engineer's questions. We give them for what they are worth, without thinking that they contain much that is novel or original.

All *candidates for a commission in the Engineers* may obtain one without passing through an Engineer school, by serving a certain time as a non-commissioned officer, and afterwards passing an examination in fortification, artillery, tactics, military administration, topography, architecture, law, and drawing, according to the programme in force in the Nicholas Engineer School. Candidates who have been educated in establishments where mathematics and natural sciences do not form part of the syllabus, have, in addition, to pass in physics, chemistry, analytical geometry, and elementary mechanics.

The new System of Tactical Instruction in the Russian Army generally.

Various circumstances peculiar to Russia have hitherto contributed to produce a great diversity of system and a great disparity of instruction in different portions of the Army: for instance, the many diversities of climate to be met with in so widely extended an Empire; the various degrees of concentration of the troops in different districts, affording more or less facility for supervision and combined action; the smallness of the barracks at some stations; the absence at many of covered drill-yards, so necessary in many parts of the country for winter work; the want of ranges, &c. Out of about 600,000 field troops in 1880, about 159,000 were quartered in barracks, the remainder being either in private houses occupied as barracks or in billets. The reserve and local troops are better off in this respect; the cavalry worst of all, regiments being often broken up and scattered amongst farms and villages.

The older soldier, who has a great deal of garrison duty to perform, had but little time for instruction of any kind during the winter months, except in the company and regimental schools, where there was always a good deal done. The recruits, who joined mostly in January, were drilled, not very efficiently, for four months, after which they spent from two to four months in camps of exercise, being assembled for the purpose of completing their training, sometimes by separate arms, sometimes in mixed bodies of all arms. During the remainder of the year the men were allowed to assist in harvest work, to cultivate the regimental vegetable-gardens, and to repose, none of which occupations conduced directly to tactical efficiency, whilst the cavalry and artillery horses were turned out to graze. In former days, when the term of service was longer, and when the demands on the skill of the individual soldier were much smaller, the system in force was sufficient to produce troops equal to all ordinary requirements, and, indeed, excellent as far as mere parade work goes. Now, however, that service with the colours has been reduced to five or six years, and that so much more is demanded of the soldier, both with regard to skill in shooting and to alertness and handiness in action; now, too, that so much is required of the Officer, even of the lower grades, in the way of intelligence and initiative, it is not surprising that, notwithstanding the gallantry and devotion of all ranks, the results produced under the system just described failed to be satisfactory when brought to the test of modern warfare. Hence, for some years back, commanders of military districts have endeavoured, by issuing annual programmes of instruction, as supplementary to the drill regulations, to improve, as far as possible, the training of their troops and to make good all palpable defects.

The Corps of Guards, the troops in the St. Petersburg district, in the general government of Wilna and in the kingdom of Poland, led the way in this matter. But where so much depends upon the competency of each commanding Officer, it is difficult to ensure uniformity, even with a strict system of inspection. The necessity for a considerable degree of uniformity was, however, apparent; and the want of it was still more clearly shown n the war of 1877-78, in consequence of which experience, the "Head Committee for Army Organization and Training" was appointed, whose first business was

to gain complete information as to the mode of carrying on the service in the different districts, with a view to the adoption of a programme suitable to all circumstances and situations.

All the reports thus collected were forwarded, with a series of questions, to the General Governors and Commanding Generals for their remarks and opinions, which they were requested to communicate to the Head Committee by the autumn of 1879 at latest. The whole mass of documents was next laid before a special mixed committee of infantry, cavalry, and artillery Officers (the Engineers had a committee of their own), which proposed during the winter of 1879–80 a project for the annual course of instruction. This was forwarded to the various Commanding Officers, for their remarks, and, after some alterations, was put in force on the 22nd September, 1881, under the title of "Distribution of Work throughout the year in the Army." We proceed to give an abstract of the principal regulations concerning the training of the different arms, including field service [1] and manœuvres.

The whole year is divided, for training purposes, into two main periods—that of winter and that of summer. The former is again subdivided into two sections, the first of which extends from October 1st to December 1st, that is up to the supposed embodiment of the annual contingent. In reality, however, cavalry recruits come in somewhat sooner; and those of the other arms somewhat later. The second section of the winter period lasts from December 1st to May 1st; that is to say, until the commencement of the summer exercise. The first section of the winter period is devoted to interior economy, school work, elementary drill, and to training drill instructors. Officers are practised in field duties with skeleton units. As soon as the recruits join, more pressure is put on, and the training of the young soldiers becomes the principal subject of attention. This training is regulated by very particular instructions, which go into the minutest details, bear the impress of great humanity, and show the desire to economize to the utmost the strength of the young soldier. In order to gain as much time as possible for special military training, recruits are not allowed to attend school during their first winter. Captains of companies have themselves to give instruction in all that concerns *morale* (love of country, feeling of honour, strict performance of duty, &c.). Subalterns and non-commissioned officers specially attend to the mechanical training (drill, handling of arms, and so forth). There is a special short course of drill laid down for the infantry recruit in war-time which is supposed to qualify him for the ranks in two months' time. Cavalry and artillery recruits do not require to be pushed on in such a hurry even in war-time, as those arms have a superfluity of reserve-men ever ready to fill up gaps.

There is also a special programme for the summer course (that for the Artillery, however, together with their "field exercises," is still under preparation). On the 1st of May all detachments assemble at the battalion or regimental head-quarters for the purpose of going through the prescribed exercises. This is done in order to ensure more complete supervision, as in the opinion of the higher authorities in Russia no Officer below the rank of colonel Commanding a regiment should have the power of modifying the programme.

This programme includes—1. drill; 2. field exercises against a supposed enemy, working out a tactical idea; 3. field exercises, one body acting against another; 4. field service; 5. exercise of units raised to the war strength; 6. the construction of field works and the strengthening of positions; 7. gymnastics as applied to field purposes (jumping, climbing, running, &c.); 8. rifle practice and judging distance.

The annual course is further subdivided, for infantry, into company drill

[1] By "field service" is meant everything relating to reconnaissance, outpost duty, camp duties, and what we call "minor tactics."

for six weeks, battalion drill four weeks, and regimental drill two weeks. These exercises, however, as well as rifle practice and field duties, are only partly executed at the regimental head-quarters, being in great measure performed at the large standing camps, where whole Divisions are assembled. The rifle brigades often occupy a special camp for rifle practice and exercise in field service, in which they excel, at Oran, in the Wilna district.

Cavalry.—Squadron drill lasts four weeks; and regimental drill three weeks. Regiments are now often concentrated in brigades and Divisions for field exercise, being only sent to the summer camps in combination with the other arms, when the special cavalry exercises have been completed. Both cavalry and artillery horses are turned out annually for four weeks to graze, either at midsummer, before the commencement of the manœuvres for all arms at the camps of instruction, or after these are concluded, according to the weather and to other circumstances.

The *Artillery* is mostly concentrated by brigades at large garrison towns, being exercised in their immediate neighbourhood. It is difficult to make an exact distribution of time for the battery exercises, because the number of places where ranges are available for artillery practice is comparatively small; and consequently some batteries have to march long distances to reach their place of assembly, which occasions a considerable loss of time. Again, owing to this scarcity of ranges, batteries and brigades cannot fire simultaneously; so that they cannot all take part in the combined manœuvres of all arms.

The *Engineers* are drilled from May 1st to June 1st. They then go through a course of practical training by companies for at least five weeks, and afterwards of brigade exercises in camps of their own during all the rest of the summer, except for the period of a fortnight, when they take part in the combined manœuvres of all arms.

The technical training of engineers is so extensive that they often cannot complete their course in one summer, but have to carry it forward to another year. It is in contemplation, therefore, to lighten their labours by shortening their course of rifle practice, and by reducing the amount of their tactical instruction, in both which branches of work they often surpass the infantry, as we have already mentioned. The combined manœuvres are carried out in the large summer camps, and last four weeks, taking place earlier or later, according to the time of harvest. The infantry do their long-range shooting and their field firing at these camps; but their principal object is to accustom the different arms to work together either against a represented or supposed enemy and in the practice of field duties. Officers also have "skeleton drill," which in the case of artillery and cavalry takes place at the grazing season.

Schemes of instruction have been drawn up to serve as a general guide, so as to ensure steady and regular progress, being calculated for an Infantry Division, with its artillery brigade and detachment of engineers, and for a Cavalry Division, with its complement of Horse Artillery.

All rules are clearly laid down for regulating the manœuvres, in which the umpires play a very important part.[1] Great attention is paid to the work of reconnaissance, to skill in occupying ground and in strengthening positions, and to the harmonious co-operation of the different arms. At the end of each manœuvre the commanding General makes a critique of the whole performance in the presence of all the Officers. The principal peculiarity to be noticed is the practice of night-marches and of outpost duty by night, first by moonlight and on known ground, afterwards on a dark night and on unknown ground. These night drills are supposed to last not less than twelve hours, whilst those carried on by daylight last at least six hours at a time. Marches of mixed detachments on a large scale are to take place also in winter, and

[1] And too often are obstructive, partly from slowness and want of decision. A sufficient supply of really trustworthy umpires is difficult to find in any army.

were practised for the first time in February, 1882. In order that Officers and men may gain a better idea of the conditions under which they will have to manœuvre on service, all the companies of a battalion are occasionally formed up together into one company, and all the battalions of a regiment nto one battalion for drill. Each captain is, if possible, to have the opportunity, in the course of the summer, of commanding a company on the war footing.

Cavalry, as well as infantry, practise throwing up field works. When this is done on an extensive scale, engineers are, if possible, to take part in it; but all Officers are expected to know how to trace works, and how to direct the workmen.

By *field gymnastics* men are trained to get over every sort of obstacle in the quickest and best manner, in doing which they go through a systematic course of instruction.

Rifle practice and judging-distance practice have already been treated of in connection with the special training of infantry. The regulations, of which an abstract has just been given, only came officially into force in 1882; but their general tenour was well known in 1881, and they were more or less completely acted upon at the different summer encampments in that year, so that some idea may already be formed of their general effect. The prevailing opinion appears to be that they are, on the whole, very good, and calculated to produce an uniformity in training, which was previously deficient. Where they seem to err is in being too minute and detailed; at the same time, if adhered to strictly, not a moment of the time available for instruction will be wasted—a matter of great importance in a country like Russia, a large portion of which enjoys but a short summer; and, indeed, notwithstanding the most careful economy of time, the summer-drill period is too short for all branches of training to be attended to as thoroughly as desirable. One great defect of the system is said by some to be that mere drill occupies too much time at the expense of higher training, a main cause of which is the system of assembling the troops in large camps of instruction, where the ground available for exercise is but small in proportion to the number of troops concentrated. It is generally also flat and open, and becomes shortly quite familiar to all Officers; and as the troops may not go beyond the ground immediately surrounding their camps, on account of the standing crops, the different corps get into each other's way.

The same inconvenience arises in target practice, especially in firing at what should be unknown distances. *Moreover, a large concentration of troops is a temptation to have frequent inspections and reviews, which interferes with real work*, although, by the new regulations, these shows are reduced to a minimum.[1] Then a good deal of time is taken up every year in making the constructions necessary for camp life. The upshot of it all is that, although the troops parade twice a day for drill, a part of the prescribed course has to be omitted for want of time, and other parts, such as rifle practice, judging distance, field duties, marching out, &c., can only be gone through in a cursory manner.

The late General Skobeleff, whilst in command of the 4th Army Corps in the summer of 1881, started manœuvres on the German system; that is to say, on ground unknown to those engaged, and conducted in a practical service-like manner. His two Divisions were quartered in separate camps, and operated against one another towards the close of the proceedings. The results appear to have been satisfactory, except in the case of the cavalry, which is said not to have been as active as it might be.

It is said that Russian Officers generally agree in thinking that it would

[1] This is especially the case when the "camp of instruction" is near the metropolis, like our own Aldershot, for instance.

be desirable to substitute for the large summer camps smaller concentrations of troops by regiments or brigades, with a due proportion of cavalry and artillery attached, in the neighbourhood of the head-quarters of the troops assembled, for the purpose of going carefully through all the branches of military training; and then to conclude the year's work, according to the example set by General Skobeleff's corps, with a real manœuvre on a large scale carried out by two bodies opposed to one another. If this scheme were carried out, the troops would doubtless be better trained in all the details of their duties, and subordinate Officers would be thrown more upon their own resources, thus gaining confidence and experience; but circumstances in Russia are against it, and before it can be worked with success changes must be made in the distribution of the troops and in the mode of supervision exercised by the higher Officers, who at present do not appear to leave sufficient latitude to those under their command.

Many Russian authorities also are in favour of doing away with the leave granted annually for harvest work, which leave is given solely, as is well known, for the purpose of affording the soldier a chance of adding something to his very poor pay. This harvesting not only causes a great loss of time which would be valuable for military purposes, but is also prejudicial to discipline. The practice, too, of turning the horses out annually to graze is also naturally condemned, as the animals lose condition just when they are required to be in full vigour. Reform in these matters is merely a question of time, and depends upon financial considerations. Prolongation of service with the colours is another point in contemplation which, if carried out, will tend to facilitate military training.

Military Transport.

The organization of this important part of an Army is at present in a provisional and rather chaotic state, very detrimental to efficiency. At present, every regiment and every other independent unit, also each of the higher staffs, has its own so-called *intendance train*, comprising carriage for Officers' baggage, the military chest, orderly room, prisoners, ammunition, sick, and medicines, &c., always ready, as far as *matériel* goes, and even in peace-time partly provided with draught animals and drivers.

We have already noticed the *special trains* belonging to the Artillery and Engineers in our account of those corps. In addition to the intendance train which accompanies the troops and forms the first line of transport, there follows a second line of so-called *intendance transport*, the amount of which is uncertain, and is determined only on mobilization. Each of these *transport trains* carries ten days' provisions and three days' forage for an Infantry Division and the Cavalry attached to it, being divided into four sections, and having an establishment of 5 Officers, 3 officials, 42 non-combatants, 48 baggage masters (non-commissioned officers), 648 privates, 580 wagons, and 1,290 horses. The whole of the intendance transport trains of a field Army are under a *chief of intendance transport* (a General), who is directly under the Chief of the Staff of the Army, and not under the Commissary-General, who is also a General Officer.

The Chief of the Staff has, with regard to the *personnel* of the intendance transport trains, the jurisdiction of a General Commanding an Army Corps; and the chief of intendance transport, that of a Divisional General. A transport commander (Field Officer or Captain) commands each transport train, with the powers of an independent battalion Commanding Officer. The *personnel* of each section of the train forms a *baggage company*, under a superior Officer, with the powers of a Company Commander. Besides the above-mentioned organized military transport, there may be an indefinite number of hired or requisitioned vehicles to supplement it. There is no

special *transport corps*, such as exists in most European armies. The men who are attached to the trains wear the uniform of the corps to which they belong, and are armed only with hatchets, the non-commissioned officers carrying sabre and revolver. Most of the men are drawn from the cavalry reserve, which has always a good many men to spare after the cavalry regiments are completed. The Officers are told off specially for baggage duty, being selected from Officers and non-commissioned officers who have retired from the service, but who return to it on mobilization.

Matériel.—There are at present two totally different systems in force—the old and the new. With regard to the former, we will give, by way of example, the details of the war establishment of transport for an infantry regiment:—16 ammunition wagons, 17 provision ditto, 5 for carriage of sick, 1 for orderly room, 1 for paymaster, 1 apothecary's wagon, 1 for tools, 1 for hospital necessaries, 16 tent wagons, all with four horses; 1 apothecary's cart, with one horse: altogether 60 carriages, with 249 horses and 125 men.

With the so-called new system, there are both light two-horse carts (pattern 1876) and four-horse wagons.

For each infantry regiment, 10 baggage carts for Officers, 16 provision carts, staff ditto, 2 ambulance ditto, 1 apothecary's ditto, 1 hospital stores ditto, each drawn by a pair of horses; 12 ammunition wagons, 16 or 17 provision wagons, 1 staff ditto, each drawn by four horses. Total for regiment, 61 or 62 vehicles; 180 or 184 horses.

Some regiments have, in place of the 16 (four-horse) provision wagons which follow in second line with the divisional train, 32 two-horse carts. Since the last reductions, a very small proportion of these vehicles are horsed in time of peace. Other units are supplied with carriage, each in similar proportion to its strength: thus, for instance, a cavalry regiment has from 18 to 20 vehicles, with from 43 to 51 draught horses. The Turkestan brigade of rifles has pack animals in lieu of carts; for the four battalions, 84 in peace and 388 in war, including 331 camels.

In the Caucasus, each infantry regiment has 64 additional four-horse wagons for tents.

All the different kinds of vehicle hitherto in use were proved to be very defective during the war of 1877–78, principally on account of the small amount of stores which each could carry in proportion to the dead weight; in consequence of which the horses were overworked, especially on bad roads, which were not uncommon, and the baggage train was often several marches in rear of the troops, who were thus in want of the most necessary articles.

A Commission was appointed in 1881 to study the subject of the best system of organization and equipment for a baggage train, which Commission has been sitting since September, 1881, without, as far as we are aware, coming to a decision. All the wagons submitted to it for approval were rejected; but it is believed that the four-horse wagons used by the Russian border peasants are considered the best, and next to these wagons entirely constructed of iron. Whatever conclusion may be arrived at, one thing is certain, that a reconstruction of the military train will entail a large expenditure, and will require much time; the most urgent question, therefore, is, how best, in case of need, to utilize the existing *matériel* so as to combine the utmost attainable mobility with due attention to the wants of the soldiery.

The best and only present remedy seems to be that of increasing the number of draught horses for most of the vehicles. In order to make the matter more intelligible, we will give a few details with regard to the supply of ammunition and other necessaries to troops on service in the field.

First and foremost comes *ammunition*. The soldier carries sixty rounds on his own person. The twelve ammunition wagons in first line, which accompany the infantry regiment, carry sixty rounds per man. Each of these wagons has a dead weight, including the *personnel* and forage for its horses, of about

24 cwt.; so that it is not possible, without overloading, to carry more than about 8 cwt. of ammunition.

Now, assuming the strength of a regiment in privates to be 3,200, to supply them with sixty rounds per man, we require 192,000 rounds, the weight of which is about 182 cwt.; that is to say, we want carriage for over 15 cwt. of ammunition on each wagon. But the reserve entrenching tools are also carried on the ammunition wagons, making an additional load for each of nearly 3 cwt. The total load per wagon, including dead weight, will thus amount to 42 cwt., or 10½ cwt. per horse, instead of about 9 cwt., which is considered the maximum. When carrying so excessive a load, it is impossible for wagons to keep up with the troops, except on good roads; and in action, when they will be required constantly to leave the metalled roads, they must needs lag behind. One remedy proposed is, that the number of rounds per man carried on the regimental wagons be reduced from 60 to 36, in which case the soldier would have to carry eighty-four rounds on his own person. This, however, can only be done if the weight of his equipment be reduced, as, indeed, has been proposed, by substituting a light canvas valise for the present knapsack. Another expedient would be to increase the number of wagons; but this appears to be inadmissible when we consider the immense mass of vehicles already accompanying an army. Thus we must needs come back to the proposal of adding an additional pair of horses to each wagon, as the one only immediate way of helping us out of the difficulty.

This additional pair of horses will, of course, entail an extra man to look after them. There being plenty of horses in Russia, and the animals being subject to conscription, this change might be carried out pretty quickly, though, of course, it would cost a good deal. With six horses to each wagon, the reserve ammunition wagons might be made to carry 90 rounds per man instead of 60, which would no doubt be an advantage.

Next comes the carriage of food, in which we find the same difficulty. The sixteen or seventeen two-horse carts and the sixteen four-horse wagons carry altogether for each man five days' biscuit, three days' groats, salt, and lard, besides camp-kettles and other cooking necessaries, the company books, implements, stretchers, &c. The two-horse cart, one of which is allotted to each company, has to carry one day's biscuit, &c., for each man. Reckoning the company at its full strength of 240 men drawing rations, this entails a weight of nearly 12 cwt.; add to this the 15 cwt. dead weight of the two-horse cart, and we have a total of 27 cwt., or 13½ cwt. per horse. A third horse is, therefore, here required.

The sixteen four-horse wagons transport the remainder of the rations, the weight of which is about 17½ cwt., which, added to the dead weight of 24 cwt., makes up a total of 41½ cwt., or over 10 cwt. per horse. As it is not advisable to reduce the supply of provisions carried actually with the army, which amounts, including the three days' rations in the soldier's haversack, to eight days' rations, it is evidently advisable to give an extra pair of horses to the four-horse provision wagons.

Again, take the case of the Officers' baggage carts, which are always supposed to keep well up to the front: each field Officer being allowed 178 lbs. and each Captain 89 lbs., the total weight on each of the ten carts is about 25 cwt., that is, 12½ cwt. per horse. Here also a third horse is required.

The ambulance train of the regiment consists of the apothecary's cart, of the hospital-store cart, and of two light ambulances, each for eight sick. It has been already determined to increase the number of horses for each of these three latter vehicles from two to four, in which case the load will amount to about 9 cwt. per horse, which is not excessive. But the apothecary's wagon is so heavy that even four horses are not enough to draw it. Too large an allowance of hospital stores seems to be carried; at any rate, too large for the transport allowed. At present the supply is for thirty-six sick per regiment.

It has been proposed by the chief medical committee to reduce this number to sixteen. Even then more than 22 cwt. would have to be transported, which is more than the existing means are equal to.

All these details serve to prove how far behind its requirements is the organization of the Russian field train. Deficiencies in this respect are, indeed, to some extent made good, when the need arises, whether at home or abroad, by requisitioning or pressing wagons for the public service. This was the case more especially during the late Turkish war with the intendance transport, which made great use of such means for adding to its supply of vehicles. But, after all, there is in the Russian baggage service even a more important defect than the want of proper *matériel* and of baggage animals, and this is the want of proper military organization and of supreme control. As an example of this, we may mention that, during the war of 1877-78, the head-quarter baggage of the Grand Duke Nicholas required 500 vehicles and 1,500 horses to transport it, and had to move in four successive columns. Even the first column, which was supposed to keep up with the Grand Duke, was frequently one or two days' march to the rear, so that the head-quarter staff were often in want of the commonest necessaries. Such being the case, the hardships undergone by the troops may be imagined.

Special battalions and squadrons of the military train should doubtless be created as a nucleus for this important service.

In Table III of Lieut.-Col. Hildyard's valuable article on "The Intendance, Transport, and Supply Services in Continental Armies," in No. CXVIII of the Journal R.U.S. Institution, will be found the "present establishment of regimental trains in Russia," with many details omitted in the present paper.[1]

Intendance and Supply.

The Field-intendance Department is responsible for the whole supply of an army in the field, being one of the five chief departments of Army administration, and directly under the Commander-in-Chief. At its head is the chief of the field-intendance, under whose control are the intendants of Army Corps, Divisions, and detachments, also those of the military districts bordering on the theatre of war, as well as any local administration which may be formed in the enemy's country during the course of the operations.

As far as regulations go, everything connected with Army supply in the field is carefully arranged. Purchases are either made directly by the intendance, or else supplies are obtained by contract or by requisition. During the last war both the system of direct purchase and that of contract completely broke down, the supplies obtained from both sources, even of clothing and warlike stores, being utterly inadequate. This was due partly to incompetence and confusion, partly to dishonesty on the part of those employed, but not by any means to want of resources.

In the absence of local means of supply, troops in the field are rationed from the three days' supply carried by the men, and from the five days' subsistence in the regimental and Divisional wagons, which are replenished in the various manners above mentioned, or from the various magazines which are established on the lines of communication. Two or three marches in rear of the regimental or Divisional trains there should be one of the intendance columns, which carries from eight to ten days' provisions of all kinds for the Division, together with the special troops attached to it, in 580 vehicles, drawn by 1,290 horses. This column is completed with supplies in the same manner as the trains in the first line. Hence rations of all kinds, except meat, for from sixteen to eighteen days, are supposed to be ensured by

[1] Commanding officers are said by an eye-witness of the last Russo-Turkish War "to break through all regulations, and to have a vast number of vehicles at their disposal, which turn out very useful on service."

the trains in first and second lines. A further reserve (the so-called intermediate magazine) follows at a distance of from two to three days' march, with from fifteen to thirty days' supply. Further to the rear again, and connected by rail with the base of operations, is the grand magazine, with from thirty to sixty days' subsistence for the Army Corps or Army. The provision train of an army of ten Divisions is said to convey ten days' supply for 230,000 men. Stores are conveyed from the magazines in rear to the front, should there be no railway available, by means of hired transport. The Russian authorities have, with wise foresight, formed large supply magazines near the western frontier, which magazines are kept full even in time of peace. At Wilna, for instance, there is a large military bakery, in which some hundreds of men are employed. There are besides supply depôts in all the military districts, and stores of clothing and equipment, all under the intendance.

The supply of *forage* for the horses is regulated in a similar manner. Every saddle horse always carries two days' supply, and every baggage animal four days' supply. From two to four days' march to the rear is an *expense magazine* of forage; and at about the same distance again, towards the rear, is an *intermediate magazine*, with from fifteen to thirty days' supply of oats or barley and of hay. It is not usual to transport hay or straw to any distance, and the troops must, as far as possible, obtain them locally.

Ammunition.—The supply is ensured by equally systematic regulations, through successive échelons,—first, in the men's pouches and on the limbers; secondly, half a day's march in rear come the small-arm and gun ammunition wagons; thirdly, from one to two days' march further back, the sections of the "*flying divisional park;*" fourthly, at the distance of two or three days' march, the *mobile parks;* fifthly, three or four days' more to the rear, and next to the base, the great *ammunition magazines*, which are in the same line with the *advanced artillery matériel depôt* and the *provisional small arms magazines*, which are all completed from the depôts in the military districts.

The Engineers are supplied with reserve equipment of all descriptions, from the Central Engineer Arsenal at Dünaburg, in which everything required for the train of a sapper battalion and of a pontoon half-battalion is constantly kept in readiness, as well as materials for preparing a second equipment of the same dimensions. There are, besides, several depôts of entrenching tools and other siege *matériel.*

With regard to the foregoing details upon the system of supply in the field, it may be well to remark that they are gathered from official documents, and undoubtedly show what the regulations are upon the subject. How far these, apparently complete, arrangements are carried out in practice we cannot say, and, remembering the great deficiencies which came to light during the last war, we cannot help being somewhat sceptical on that head.[1] At the same time we have the fact before us, that the Russian military authorities were fully alive to the shortcomings of the services of supply and transport, and that commissions of inquiry have been busily engaged, since the war, in going to the root of the matter. Hence, it is natural to suppose that important reforms have really been made.

Let us, for a moment, compare in a summary manner the provision made in the Russian Army (according to regulation) with that made in the Austrian and German Armies, for the supply of food and forage for an Army in the field.

[1] We may instance the well-known fact that, during the early stages of the siege of Plevna, there were no entrenching tools to the fore, and the gallant assailants had to scoop out cover for themselves with their fingers and with the lids of their messtins; demonstrating, not for the first time in warfare, the necessity of making the soldier carry an entrenching tool on his own person—a necessity now acknowledged and more or less provided for in all armies."

We shall find that the arrangements in Russia are on the largest scale, whilst those in Germany are on the smallest scale of the three Powers mentioned. In the matter of ammunition Russia again heads the list, whilst Austria is at the bottom of it.

The supply of entrenching tools and other siege *matériel*, also for the construction of telegraphs, is much larger in a Russian Army than in a German or an Austrian force.

In Russia, as we know, the Army Corps does not occupy the same important position as a tactical and administrative unit as in most European Armies. It is significative of this, that there is no special Army Corps train except for its staff. But, taking the Army as a whole, it is very richly endowed. The train for an Army, consisting of five Army Corps, consists of 7,742 vehicles, 20,723 horses, and 12,152 men, besides 4,000 reserve horses, with 1,548 men. This is exclusive of regimental and divisional trains and hospitals: including these, we arrive at a grand total of 17,000 vehicles, 41,700 horses, and 45,200 men.

An Austrian Army of the same size would require 15,300 vehicles, 46,000 horses, and 39,400 men; whilst a similar German force would only be encumbered with 8,800 vehicles, 34,500 horses, and 28,000 men.

A Russian Army has always, moreover, in addition to its military train, an enormous number of hired and requisitioned vehicles, which, however, will probably be the case with the Army of any Power during long-protracted operations. It certainly was the case with the German Armies in France in 1870–71, notwithstanding the important assistance given by the railways.[1]

The Hospital Department.

In peace time there are, in addition to the *personnel* of the hospitals, and to that attached to the higher staffs, one regimental surgeon and four battalion surgeons per infantry regiment, and one dresser to each company. Other corps have a medical staff on a similar scale, in proportion to their strength.

Military surgeons in Russia are not Commissioned Officers, but civil officials, with military uniform and relative rank. Regimental surgeons rank as Field Officers, up to Colonel; junior surgeons, as Captains and Lieutenants.

The sick are at once sent to a general hospital, if there be one at hand. These institutions are of various size, up to 1,000 or more beds. Should accommodation for less than 150 sick be required at any considerable distance from these general hospitals, *half-hospitals* or *detached hospitals* are formed. In many places, military patients are treated in civil hospitals.

Wherever there is neither a *general hospital* nor a civil hospital, *military infirmaries* are opened, if necessary, with from 200 to 500 beds. Some of the Guard regiments have so-called *reinforced infirmaries*, which, unlike those of other corps, remain in Petersburg when the troops take the field. All hospital attendants wear uniform.

All military medical institutions are under the District Military Medical Commission, which is responsible to the District Inspector of Hospitals, who is one of the District Staff Officers.

Every hospital and other medical establishment is in like manner under a combatant Officer—an arrangement highly disapproved of by Russian military surgeons as detrimental to efficiency.

In war time the same dual system exists. Medical establishments of

[1] A compressed ration of forage "was very extensively used by the mounted branches of the Russian Army during its campaigns in Turkey, the weight of which was only $3\frac{3}{4}$ lbs.; and it was of so portable a nature, that a supply of from four to five days could be carried attached to the saddle, without inconvenience to horse or man." (Colonel Hildyard's article on "Intendance, &c.," p. 902, No. CXVIII, "Royal United Service Institution Journal.")

every description are under two chiefs: first a General, who is inspector of hospitals; and secondly, in respect of purely technical and medical questions, an army surgeon—the *military medical inspector*. Both these Officers are responsible to the chief of the staff of the Army.

According to existing regulations, when the Army is mobilized—1. *Provisional military hospitals*, each for 35 Officers and 600 men, are organized. These follow the Army at the distance of several days' march, being distributed according to the directions of the Commander-in-Chief. Each hospital has a separate train, 3 apothecaries' wagons, 24 other vehicles, and 114 horses. Neither men nor horses are maintained in time of peace, but all necessary *matériel* is kept in the intendance depôts. 2. *Mobile hospitals* are formed by order of the Commander-in-Chief. These keep up with the Army, each being supplied with the *matériel* of two *mobile Divisional ambulances*. 3. The mobile Divisional ambulances are created for the care of sick whilst the troops are in movement, and for forwarding them at need to the nearest provisional and general hospitals; also for collecting and tending the wounded on the battle-field, and for taking care of the more serious cases until sent back to the provisional hospitals. The Divisional ambulance has accommodation for 6 Officers and 160 men. It may be divided into two sections. The *personnel* consists of 10 surgeons and assistants, 3 Officers, 209 men, and 1 chaplain; also of a company of bearers, numbering 1 Officer, 9 non-commissioned officers, 200 privates. The baggage train of the ambulance comprises 24 small and 6 large ambulance wagons, 2 heavy and 3 light apothecaries' wagons, 2 wagons for furniture and provisions, 22 for tents, 223 draught horses, and 7 saddle horses. In peace time the *personnel* is reduced to a minimum, and is included in the establishment of Infantry Divisions. Horses are only maintained in time of war; the *matériel* is under charge of the infantry regiments 4. The *regimental field ambulances*, which are always in the immediate neighbourhood of the regiment or corps to which they belong. To them the sick resort in the first instance, and, after receiving the first treatment, are despatched to the nearest hospital or Divisional ambulances. The regimental field ambulance is provided with tents and with ambulance wagons. When the troops are halted, it is opened, if required. During an action the ambulance wagons are posted from three-quarters of a mile to one and a half mile in rear of the fighting line, the wounded being brought to them on stretchers by the bearers, supplied with what is urgently needful, and again removed on stretchers to the Divisional ambulances, which are posted from three-quarters of a mile to one and a half mile further to the rear. In line with these latter are also the Red Cross establishments. All wounded men who can bear transport are removed in the wagons belonging to the Divisional ambulances to the provisional field hospitals and Red Cross hospitals, whence they are again despatched, as soon as possible, to the nearest railway station, and distributed over as large an area as can be. The system just roughly described was in force during the late war, and did not satisfy those who had to work it.[1] Immediately after peace was declared, a special Commission was assembled for the purpose of preparing a scheme for reorganizing the service of field hospitals in time of war. The Commission has made its report, which is believed to recommend considerable changes, the result of which will be a very great increase to the means at the disposal of the Medical Department of an Army in the field.

It is proposed to divide the medical establishments into two main sections: 1st, Field ambulances; 2nd, Provisional field hospitals. Under the first head are included—A. Divisional ambulances at the head-quarters of Infantry

[1] One who was present at Plevna states, however, "I never saw wounded or sick so rapidly removed. This perhaps was because the Russian Army was stationary, and the regimental baggage trains could be requisitioned on emergency."

Divisions ; B. Regimental ambulances with regiments of cavalry and infantry, brigades of artillery, &c. Under the second head are included—A. Mobile Divisional hospitals ; B. Mobile provisional field hospitals ; C. Provisional reserve hospitals ; D. Sanitarium for convalescents ; E. Convoys for the evacuation of sick and wounded by road ; F. Hospital railway trains. Regimental ambulances will be in first line, and Divisional ambulances in second line, the two combined being on such a scale as to give the immediate attention required to 2,000 wounded per Division. There will be eight stretcher-bearers on the strength of each company, and a company of 200 bearers with each Divisional ambulance. Both regimental and Divisional ambulances will be entirely under medical authority.

The mobile provisional field hospitals are provided with military transport ; but the reserve provisional hospitals depend upon transport obtained by hire or by requisition. Each of these hospitals, of which there are to be eight per Infantry Division (four mobile and four reserve), will accommodate 10 Officers and 200 men. Therefore the seventy-six Divisions provided for by the new scheme (instead of seventy-two as hitherto) will require 608 provisional field hospitals, which will accommodate 127,680 sick. One mobile provisional hospital will be allotted to each Infantry Division, whilst the rest of these and all the reserve provisional hospitals will be at the disposal of the Army Head-quarter Staff.

The train of the mobile Divisional hospitals will be used for the transport of hospital *matériel ;* not for that of the sick, for which separate carriage is provided. Field hospitals are to be managed by committees, each of which will consist of a senior surgeon as president, of a junior surgeon, and of a paymaster. The supreme control, however, rests with a combatant Officer. This system of divided command, thus retained in the case of the field hospital, though abolished in that of the ambulance, is very distasteful to the medical staff.

The provision for sick and wounded, large as it is under the new scheme, is still considered by experts to be insufficient ; and the opinion prevails in Russia that, even with the best and most liberal arrangements, private assistance cannot be dispensed with in war to supplement what is provided by the State ; moreover, that volunteer assistance in the case of sick and wounded must be welcomed even in the first line.

According to the Returns of January 1, 1881, there were in the Russian Army, altogether, 2,508 surgeons, 256 apothecaries, 269 veterinary surgeons, 3,954 dressers of the 1st class, 2,743 dressers of the 2nd class, attached to companies, squadrons, and batteries, and 1,099 veterinary assistants. The surgeons were 279 under the peace establishment.

The Army medical staff is recruited from the Imperial Medico-Surgical Academy, in which the course of instruction lasts five years. There were on January 1, 1881, 1,073 students, including 105 of the veterinary art. In 1880, 388 students passed into the service, of whom 193 as surgeons and 24 as veterinary surgeons. As the medical staff has to be more than doubled in time of war, the supply from the Academy is quite insufficient. There are also schools for *dressers*, in which the course lasts four years. On the 1st January, 1881, they contained 1,285 scholars, of whom about 250 passed out during the year. Dressers are also trained regimentally; and of these there were 6,097 under instruction on 1st January, 1881, 2,780 having passed as dressers from the ranks during the previous year.

[*To be continued.*]

INSTRUCTIONS FOR THE CONDUCT OF THE INFANTRY SOLDIER IN ACTION.[1]

By Lieutenant-Colonel R. v. Boguslawski.

Translated by Captain W. Sawyer, Royal Lancaster Regiment.

[The framer of these "Instructions" is the author of the "Tactische Folgerungen" and a number of other valuable works well known to military students. Colonel Boguslawski has most kindly given his permission for the insertion of a translation of the "Instructions" in this Journal.—L. A. H.]

Preface.

In publishing these "Instructions for the Conduct of the Infantry Soldier in Action," which were originally printed for use in the 2nd Battalion Grenadier Regiment No. 6, in the place of the books of instruction in general use in the Army, I am complying with the request repeatedly made to me to render it accessible to larger numbers.

Notwithstanding the numerous improvements made in the compilation of similar books of instruction during the last decade, a conclusive solution of this difficult though apparently insignificant subject cannot be said to have been arrived at.

Besides general comprehensibility, clearness, and simplicity, a suitable arrangement of the matter and a composition adapted to the perceptive faculties of the soldier are principal conditions to be fulfilled.

Frequently, however, the soldier is still supplied with too much on some points and too little on others. For instance, the following may be regarded as too much :—Tactical details and formations which the soldier learns on the parade ground, or matters connected with troop leading when gone into at any length.

As too little :—When the conditions of real warfare are superficially considered, or perhaps not touched upon at all, which, the rather, should be handed down with all the greater faithfulness, the longer the duration of peace.

The main requirements of theoretical instruction appear to me to be briefly to lay before the soldier simple, easily understood rules for fighting, illustrating the fundamental laws, and representing a true picture of real warfare, and to convey to him only so much of the duties of commanders as actually concerns him.

This is the first object I have had in view. My second object is to assist superiors as much as possible in imparting instruction, for it is an old-established experience amongst troops, that most instructors find great difficulty in adopting a suitable subdivision and following the thread of the subject, especially when giving instruction on "the Battle."

The object of arranging the subject into short subdivisions and numbered propositions is further to facilitate the framing of questions and answers, to enable the instructor to work out the several propositions in his own way and suitably to his men's powers of comprehension, to apply them practically, and to support them by examples.

It need hardly be remarked that this little work belongs to quite a different category than my previous military writings.

[1] "Unterweisung für das Verhalten des Infanteristen im Gefecht." Von A. v. Boguslawski, Oberst-Lieutenant. Zweite Auflage. Berlin, 1882. Mittler und Sohn Pamph. 19 pp. Price 12 pfennings (about 1½*d.*).

It possesses this, however, in common with the greater part of them, viz., that it is drawn from actual experience.

Besides the maintenance of steady drill, and the continued perfecting of the men's training, endeavours should always be made to obtain a further advance in the province of their intellect, and in the development of their warlike character.

To contribute something to this end cannot be regarded as too paltry a task for anyone.

Instructions for the Conduct of the Infantry Soldier in Action.

1. Infantry possesses this advantage over the other arms, that it can fight both on the offensive and defensive under all circumstances, and on every description of ground: on the plain, on mountains, in woods, villages and towns, in close and open country.

Fighting Formations.

2. Infantry fights principally in extended order.

3. Close formations are usually only suitable for marching up troops for the fight. They are, however, occasionally used during the fight, mostly by night, in surprises, and against cavalry. Troops in second and third line are also in close formations.

4. The fighting line is composed of half-companies, groups, and files.

5. An interval of several paces, increased or diminished according to the nature of the ground, is kept between half-companies and groups.

6. The half-company, group, and file, by which the others march, is called the "directing half-company, group, or file."

7. The nearest body of troops in close formation behind the fighting line is called the "support."

The Duties of Half-company and Group Leaders.

8. The duty of the half-company, section, and group leaders is to direct the firing as far as possible.

9. It is consequently for them to decide what object is to be fired at, the distance, the sighting, and the description of fire to be employed.

10. For the better controlling of the firing the half-company leaders name a certain number of rounds, usually between three and five, after the expenditure of which a pause in the firing ensues.

11. The object of this pause in the firing is to allow the smoke to clear off, to subdue the excitement and unsteadiness of the men, and to enable them to receive fresh orders.

12. It is further the duty of the half-company and group leaders to keep their men in the correct formation and to lead them properly to the front or rear.

The Conduct and Movements of the Individual Soldier.

13. The soldier should move in a free and unconstrained manner and at a smart pace.

14. Should he be required to double, he will be specially ordered by word or signal to do so.

15. He will carry his rifle either at the short trail or at the secure. In running the rifle may be held in the right hand, raised.

16. The soldier must never lose the connection with his right and left-hand man. He must carefully observe the direction in which the firing line may be marching, and must conform to the same.

The various Kinds of Fire, and Fire Discipline.

17. The several descriptions of fire are :—
Firing in extended order.
Rapid firing in extended order.
Volleys by groups in extended order.
Volleys in close formation.
Rapid firing in close formation.

18. With reference to distances, firing is divided into :—
Short-range firing, up to 400 mètres.
Long-range firing, from 400 to 700 mètres.

19. It is only under very special circumstances that firing is ordered at a greater range than 700 mètres.

20. The soldier must carefully husband his ammunition, as it is easy with the breech-loader very soon to come to the end of it.

21. Firing must cease immediately on the beat of the drum, and on the signal or long-drawn whistle from the half-company leader.

22. In delivering volleys any man who fires in advance of the others will be severely punished.

On the proper Use of the Accidents of Ground.

23. With reference to the "fire fight," the soldier must be posted in such a manner as to have a clear field of fire.

24. He must also understand how to make good use of ground as cover and as a rest for his rifle, *i.e.*, undulations, walls and hedges, fences, large and small trees. He must know how to fire from windows, loopholes, shelter-trenches, and earthworks.

25. The soldier must understand how to stalk the enemy's position, *i.e.*, to approach it unobserved under cover as close as possible.

26. The men may be said to be properly trained when in changing position the groups are able to take up their places in the new position in such a manner as to be well under cover and favourably posted for firing, with great rapidity, and yet with steadiness, and without crowding or unduly opening out.

The Soldier's Position in Firing.

27. The soldier must be thoroughly practised in firing in the several positions.

28. These are—
Lying down without a rest.
Kneeling „
Standing „
Lying down with a rest, *i.e.*, the shelter-trench parapet.
Kneeling „ *i.e.*, over walls, fences, and from shelter-trenches.
Firing through loopholes.
Firing standing and kneeling from behind small and large trees.
Firing lying down is the most usual position in action.

On the Range, the Object aimed at, and the Sights.

29. The sights are always aligned on the bottom of the object aimed at, except in the following cases :—
At objects of less than a man's height—
(1.) From 75 to 200 mètres, in which case aim is taken at a point about two estimated men's heights below the foot of the object aimed at.
(2.) From 35 to 75 mètres, when aim is taken at a point only one estimated man's height below the foot of the object aimed at.

[1]Up to 270 mètres the backsight is used without adjustment; between 270 and 350 mètres the flap of the backsight is used, and from 400 mètres and upwards the sight is adjusted according to the mark on the leaf. If the range to be fired at exceeds 400 mètres, the half-company leaders will name two distances at which the sight will be adjusted, one for the first and the other for the second rank.

30. The object of this is to sweep a greater depth of space by fire, as well as to neutralize any error in judging the distance.

Signals.

31. The bugle-calls sounded in action are—

Commence fire.
Advance.
Rapid advance.
Fix bayonets.
Form column of attack.
Alert (against cavalry).

32. Those sounded after an action are—

The battalion call.
The close.
Assemble.

33. A long-drawn whistle means—Pay attention to the leader and "Cease Fire."

34. A roll of the drum means—Halt. The beating of the charge means continuous advance.

35. A forward wave of the sword means—"Advance." Raising and lowering the sword means—"Halt."

Supply of Ammunition.

36. The battalion ammunition wagons remain about 1,000 paces in rear of the fighting line.

37. From these ammunition is sent forward in bags to the men in the fighting line.

38. Men who have to return to the ammunition wagon must be careful to note the road back.

The ammunition on the dead and wounded must, as far as possible, be collected.

The General Course of the Attack, of the Defence, and of the Stationary Fire Fight.

39. The object of an attack is to drive an enemy out of his position, and to compel him to retreat.

40. To effect this the enemy is approached at first at a rapid pace, then generally in rushes, with a view to shake him by fire at effective range.

41. The advance by rushes can be carried out either by a simultaneous advance of the whole line at the run for a certain distance, after which it takes up a fresh position, or by the advance of only a portion, under cover of the fire of the remainder.

[1] Note for the instructor:—
In firing at advancing infantry at 350 mètres the flap of the backsight may be used according to instructions; should the enemy's infantry, however, lie down within the distance at which the fixed backsight should be used, the firing would naturally be too high. It appears, therefore, best to use the fixed backsight up to 270 mètres at all objects except cavalry.

42. In small engagements individual soldiers may creep forward and try to approach the enemy's position.

43. At suitable distances, according to the nature of the ground (on an average 200 mètres), the fire is increased by word of command to rapid independent firing. After which, on the command or signal, bayonets are fixed, and the attack is delivered.

44. The attack consists of a rapid advance at the run (at long distances the first part is at the double, the last at the run), accompanied by the beating and sounding of all instruments, and loud hurrahs.

45. The attack may consist of—

1st. The attack by the fighting line.

2nd. The combined attack of troops in close formation and the fighting line.

46. When at the run, no more firing takes place, but when at the double, the ranks advance by alternate rushes and deliver their fire.

47. The object of the defence is to hold a position, the enemy must therefore be kept at a distance as far as possible by fire.

48. Should the enemy, notwithstanding, begin to charge, he must be opposed at the last moment with the bayonet. This is called the Counter-attack.

49. The infantry soldier must be a good, rapid judge of distance. He should be thoroughly practised in pacing the distance and marking it off.

50. He must be able rapidly to obtain cover with the spade. He receives a special training for this.

51. A "Stationary fire fight" is one in which the combatants remain under cover, firing at each other for a considerable time.

Infantry v. *Infantry.*

52. The fight between infantry consists in reality mainly of an almost continuous rolling musketry fire.

53. The soldier must make every effort to remain cool, notwithstanding the striking of bullets and the noise of the firing.

54. He must invariably take a distinct aim, and must never fire at random.

55. Also, in rapid firing, he should try to take a quick aim at some object.

56. The common object to fire at is usually the enemy's fighting line. Should nothing but its smoke be discernible, then the thickest layer should be aimed at.

57. If Officers and mounted men can be distinguished, they should be fired at, but above all columns should be fired at.

58. At night, volleys and bayonet charges are delivered by companies in close formation.

Infantry v. *Cavalry.*

59. Infantry possesses a decided superiority over cavalry in action, both in single combat and in bodies, provided it remains cool.

60. Cavalry charges are delivered in échelons, *i.e.*, detachments following each other in rapid succession.

61. The important point is steady firing at short ranges.

62. With the sight adjusted to 400 mètres, and aiming at the foot of the object, the bullet will strike advancing cavalry throughout the distance of 400 mètres.

63. A fighting line occupying a favourable position will not close up to receive a cavalry charge, but will remain in the same, and direct its fire on the advancing cavalry.

64. Should the cavalry, however, approach to within 50 mètres, the fighting line will stand up.

65. This sudden standing up has the effect of startling both man and horse. It is, moreover, easier to aim standing at a mounted man than when lying down.

66. Fighting lines lying down in the open unprotected by any cover form up in line by half-companies, if they are not under a heavy fire.

67. When cavalry appears on the flanks, these are thrown back; when in rear, the rear rank turns about.

68. The usual fire against cavalry is by volleys.

69. When all the ammunition is expended, rallying squares and squares are formed, and these fight with the bayonet.

70. Should a fighting line be really ridden down by cavalry, the men should throw themselves down, but they must jump up again immediately, assemble either in line or rallying squares, and fire after the cavalry or at the approaching cavalry échelons.

71. The infantry soldier must never surrender in a cowardly manner, and allow himself to be taken prisoner.

72. In single combat the infantry soldier allows the cavalry soldier to come up to within 30 mètres and then fires, in case he misses he fires a second time. Should he find himself without ammunition, he jumps aside as the cavalry soldier charges him and makes a thrust at his horse.

Infantry v. *Artillery.*

73. Artillery is either plied with volleys at long ranges, or better still, a point within short range of the flank of the battery is gained if possible under cover (*i.e.*, folds of ground, bushes, high-standing corn), from which independent firing is delivered. The battery is then charged at the run.

If the guns are on the move or on the point of limbering up, the fire is directed on the horses; if they are in action, the object to be aimed at is the line of guns itself.

74. Rapid advances and diagonal movements are the best protection against artillery fire.

75. In case a battery has to be abandoned after having been captured, the removable part of the breech action is carried off.

The Conduct of Infantry during a Siege.

76. In this case it may occur that infantry has to remain, rifle in hand, in the parallels for days at a time in the presence of the enemy.

77. The individual soldier is then usually provided with 200 rounds and special rations.

78. It may be required to search a particular work in the enemy's lines with long-range firing of masses of troops.

79. The soldiers must in that case aim at the crest of the parapet, which usually stands out clearly, and particularly at the embrasures.

80. If a work has to be taken by assault, precise directions are issued beforehand as to the conduct of the skirmishers and columns, and as to the direction they are to take.

81. The most reckless bravery and the most expéditious crossing of the ditch alone can lead to the desired result.

82. On reaching the foot of the parapet the assailants halt for a moment for the purpose of forming, and then mount the parapet by means of the ladders, as well closed up as possible.

SPECIAL RULES FOR THE CONDUCT OF THE MEN IN ACTION, AND IN THE VARIOUS INCIDENTS OF THE SAME.

83. When the whistling and whizzing of bullets commences, let the soldiers

constantly bear in mind, even in the most perilous moment of the fight, that every sign of weakness is disgraceful and degrading.

84. It is strictly prohibited to attend to those who fall, dead or wounded.

It is better not to let the eyes rest on them. Men who are slightly wounded are not allowed to withdraw from the fight.

85. Wounded men coming out of the fight and returning to the rear must not dare to dishearten the reinforcing troops by expressions such as "Matters are going badly," or "You won't get off any better."

They must, on the contrary, put up with pain, and should strive to groan as little as possible.

86. Throwing packs away without orders will be severely punished.

87. Should prisoners be taken, none but those specially told off by the Commanding Officer are to take charge of them.

88. Whoever remains behind when marching into action is a dishonourable coward, and nothing but the severest punishment awaits him.

89. Whoever runs away from the fight, or induces his comrades to do so by shouts, or whoever throws away his arms, will be cut down forthwith by the nearest superior Officer.

90. Every soldier must strive to remain with his company, half-company, or group during the fight, as he cannot single-handed effect anything of importance. His concentrated attention must, therefore, be fixed on his leader.

91. Should a soldier, through no fault of his own, become separated from his company, he will join the nearest fighting body of troops and place himself under the orders of the Officer or non-commissioned officer in command of it, to whom he will render the implicit obedience due to his own immediate superiors.

92. Whenever bodies of troops become intermingled in action (which frequently is unavoidable), the superior Officer who assumes command is to be obeyed without hesitation.

93. The soldier must bear in mind that long-range firing rarely does much execution, and that its employment remains a matter of uncertainty; the leaders are responsible for the results obtained thereby.

94. Consequently, during an attack no firing must on any account take place at greater distances than 400 mètres unless it should be expressly ordered.

95. The soldier must, above all, remember to adjust his sights correctly. This is particularly necessary, as the half-company and group leaders are frequently put out of action, and the men are there and then thrown on their own resources.

96. Should the soldiers observe any movements or changes in the enemy's fighting line that may appear to him of importance, he must report them to his superior.

97. Every soldier must be able to convey an order clearly, and to make a clear report in the midst of the fight.

98. During the advance no man is allowed to hesitate or to halt, no matter how heavy the enemy's fire may be, or how severe the losses suffered. It is only when the Officer gives the command—"Halt,"—that a halt is made and a position is immediately taken up.

99. In closing on the enemy at the run, the advance must be continued without a check right up to the enemy's position. Should this not be done, and should the assailants run back, they are as good as dead, as they have to recross the ground under a murderous fire.

100. A determined charge really driven right home will invariably be successful.

101. If during the fight the enemy makes a determined forward movement, the principal thing is not to allow oneself to be intimidated.

Should some of the men lose courage and run away, they must be immediately brought back and encouraged by their comrades.

102. In the moment of danger the soldier must look to his leader, for he it is who orders what has to be done.

103. The enemy's attack must either be met with a withering fire, or he must be immediately charged.

104. Should the firing be so heavy that the orders of the Officers cannot be understood, attention must be paid to their signals with the sword, and to their personal movements.

105. When the enemy has been driven out of a position, the individual soldier must on no account rush on in pursuit, but must await the orders of his leader, and must in the meantime continue firing on the enemy.

106. The men must be able rapidly to reassemble after such an attack.

107. On the defensive, the men must be determined not to move from the position they are to hold.

108. Also in the attack it is not advantageous to fire at long ranges. The fire should be increased to the utmost from about 500 mètres.

109. The firing is commenced either by order or by signal.

110. The soldier should not allow himself to be intimidated by the enemy's shouts and close approach.

111. Every man should remain lying down and fire away steadily.

112. A position should not be evacuated except by a distinct command.

The enemy will not usually be able to withstand the firing of such a determined body of troops, but will run back.

113. Should the enemy, however, really come to close quarters, the men must be determined to engage him even hand to hand.

114. With equally good arms victory will generally fall to the combatant possessing the greatest courage and coolness, and the best discipline.

115. In close order, the rear-rank man must, above all, keep close to his front-rank man. His principal duty is to pay attention to the orders given, and carry them out accurately. He does not possess the independence of the skirmisher.

116. When the Officers and non-commissioned officers have fallen, every honourable soldier must strive to replace them. The lance-corporals, the oldest and ablest men, take command and lead their comrades on in the fight.

117. Should unfortunate circumstances and the decided superiority of the enemy compel a body of troops to fall back, no soldier must appear discouraged, or retire further than to the spot where the leader orders a halt, or to the pre-arranged place of assembly.

118. Should a soldier find himself separated from his corps after an action, he will proceed in search of it and rejoin it without delay.

All aimless roaming about on the battle-field will be severely punished.

Should a soldier have taken part in the fight in the ranks of another corps, he must carefully remember which it was, for the purpose of producing witnesses as to his conduct.

119. The soldier must behave in a noble and humane manner towards the enemy or prisoners. Under no circumstances whatever should their private property be taken from them, and they should never be ill-used without necessity.

120. The white flag with a red cross denotes dressing stations and hospitals.

A white band with a red cross worn on the arm denotes Medical Officers, bearers, &c.

These, in accordance with the Geneva Convention, are not to be fired on.

121. Firing off "Feu-de-joie" after the battle, plundering captured baggage or any similar misdemeanor, is strictly prohibited.

122. Furthermore, the soldier should be ready after an action, notwith-

standing his exhaustion, to start off in pursuit of the enemy should this be ordered, for it is only by a rapid and active pursuit that the victory is completed and further fighting avoided.

NOTICES OF BOOKS.

The Line of Communications. By Lieutenant-Colonel GEORGE ARMAND FURSE. London: Clowes and Sons. 1883. Pp. 239. Size 8¼″ × 5½″ × ¾″. Weight under 1 lb. 6 oz. Price 6*s.*

IT will be observed that the author, apparently purposely, abstains from placing on the title-page any letters or words which would remind the reader of the official position he holds on the Headquarter Staff of the Army. Consequently this fact, taken in conjunction with the dedication of the book to the "Black Watch," indicates that the work must be regarded as putting forward the views and opinions of a private individual. The book is not the less valuable on that account. Army administration is a speciality with Lieutenant-Colonel Furse, and anything that he writes on the subject is sure to be thoroughly worth careful perusal, and in this instance he has placed before us in a clear and interesting manner a subject which ordinarily is, to say the least, somewhat dry and puzzling. Military and civilians alike will derive benefit from its perusal, the former in learning from it the principles on which should be conducted work in which at any time they may have to take part, the latter in learning the extent of the organization necessary to render an army an efficient fighting machine.—L. A. H.

Glossary of Navigation. A Vade-Mecum for Practical Navigators. By the Rev. J. B. HARBORD, M.A., R.N., Chaplain of the Fleet. Second edition, revised and enlarged. Portsmouth: Griffin and Co., 2, The Hard. London agents: Simpkin, Marshall, and Co. 1883. Pp. 421. Size 6″ × 5″ × 1¼″. Weight under 1 lb. Price 7*s.* 6*d.*

IT is generally known that the modern naval Officer has to acquire a given amount of knowledge in a large number of subjects connected with the handling, fighting, and navigating his ship. It is tolerably certain that, however good his memory, there are times when, even in those subjects in which he may be strongest, reference must be made to a text-book of some kind. It is at such times that small handy volumes of reference, with exact information gathered from the larger works, and put in a form to quickly reinforce the memory, become so valuable.

One of the most recent contributions to this kind of book is that under review, which, in this edition, Mr. Harbord has considerably enlarged and improved. It contains explanations of the technical terms used in Nautical Geography, Meteorology, and Astronomy; hints to young Officers for systematic study; and information not generally accessible when wanted.

The Terms are arranged alphabetically, and the articles relating to those all-important instruments in Navigation, the Compass, Sextant, and Chronometer, are very complete and contain many hints useful to the Navigator, especially during his earlier essays in practical navigation.

In the articles on Nautical Astronomy, or "Celo-Navigation," as Mr. Harbord terms it in his book, it will be found that clear diagrams, with the necessary formulæ for ascertaining the Latitude, Longitude, and Azimuth, are given in preference to long rules. The author gives his reason for this at page 394, Term "Triangles, spherical": "There is no occasion for any verbal rules in navigation if the formulæ

for the solution of spherical triangles are remembered." Following this, the formulæ for spherical triangles are given in tables.

Under "Longitude," Sir G. B. Airy's new method of clearing the Lunar distance is added, in a convenient form and unabridged.

On the question of giving the derivation of the Terms, Mr. Harbord writes in his preface, page vii, "Those who consider this superfluous can pass them over; but I look upon them as valuable for several reasons * * * * and they frequently embody its history in a manner both interesting and instructive." Many readers will no doubt appreciate this origin of terms as an aid to memory, and value the knowledge conveyed accordingly.

Among other new terms the author substitutes "Celo-Navigation" for Nautical Astronomy, and "Geo-Navigation" for Navigation. He considers that the term "'Navigation' has been dethroned from its rightful position," and "has simply been degraded by modern writers to fill a very subordinate *rôle*." He therefore proposes to restore the term to the place it held a century ago, and re-name the two great branches of it, as already mentioned.

Although Nautical Astronomy can hardly be called an exact term, or one directly conveying the full meaning for which it is intended, still long usage has so connected the term with the subject that the proposed change—received with due consideration, as it should be—will probably be but slowly adopted. Some navigators will prefer to find their handy *vade-mecum* in accordance with the original text-books.

Another new term, "even beam," used in connection with the heeling error of the compass, is clear and definite, with no formidable opponent to encounter.

The time has now arrived when any Officer, after passing his examination for Lieutenant in the Royal Navy, may be called upon to undertake navigating duties. He will no longer be disposed to "throw his old Gradus by," as did many of his predecessors, but will rather be glad to establish an intimate acquaintance with "a silent friend" and a trusty, as the "Glossary of Navigation" should prove to be. —E. C.

Kriegsgeschichtliche Einzelschriften. Herausgegeben vom Grossen Generalstabe Abtheilung für Kriegsgeschichte. Heft I. Ernst Siegfried Mittler und Sohn. Berlin, 1883. p. 129. Size 9″ × 6″ × ¼″. Weight under 11 ozs. Price 2*s.* 6*d.*

As will be seen by reference to the preface of this periodical, the Historical Section of the Great General Staff in Berlin has taken in hand the issue of incidental selections from the mass of papers which are to be found in the archives of that Department, in elucidation of individual phases, not only of the most recent, but of former wars. These selections will for the most part be taken from the collection of narratives of the more recent operations, specially such as relate to the employment and effect of the different arms, outpost and patrolling duties, the minor operations of war, fortifications, the maintenance and administration of armies. But it is by no means intended to exclude records of events connected with former wars, on which a wealth of information is to be found in the archives of the General Staff.

It is proposed that about three numbers shall be issued annually at a very moderate subscription, the price of single numbers being slightly increased to non-subscribers. Six numbers will constitute a volume.

The cost of subscription or of single numbers may be ascertained by reference to the foreign booksellers.

The present (first) number of which a second edition has already been issued, contains—

I. The Prussian preparations for war, and plans of operation of 1805.

II. The Detachment von Boltenstern in the Loir Valley, December, 1870.

To the student of history the first is valuable as throwing light on a somewhat obscure period, and as laying open the ideas leading up to the vacillating feeling of the Prussian King which culminated in the *débâcle* of 1806, the results of which are tersely summed by the concluding paragraph of the "Reflections" which close this subject, a liberal translation of which is as follows:—

"If the political events of 1805 teach us that a State which, at a period of great disturbance, only resolves to take actual part in war when no other choice remains open, not only forfeits the consideration of other Powers, but also the guarantee of its own safety, so much the more plainly do the military proceedings indicate the weakness to which that conception of the nature of war leads which seeks its decision, not in the annihilation of the enemy's power of resistance, but in the occupation of strips of territory, and in artificial combinations based on long previously thought out plans of operation, and on imaginative presuppositions."

But, if the first is valuable to the historical student, the second article should have a charm for the more frequent student of tactics, portraying as it does an incident of that eventful and instructive period of the war in France of 1870–71 which preceded the final advance of the Army of Prince Frederick Charles of Prussia on Le Mans.

The expedition of Lieutenant-Colonel von Boltenstern in the Loir Valley on the 26th and 27th December, 1870, affords as good a tactical study as often comes before us.

His force—two battalions of infantry, a squadron, and one division of a field artillery battery—is such as may any day fall under the command of an Officer of similar rank in our Service. Happy will it be for the man who, in service of like difficulties, shows that power of distribution during the conduct of a very difficult advance, and that prompt resolution during a still more difficult retreat in the face of superior forces, which enabled Lieutenant-Colonel von Boltenstern to extricate his column without any serious loss. We should but spoil the pleasure of the study by telling the story in detail.[1]

There are two maps: one is a general map of the country embraced in the triangle Bourges—Chartres—Le Mans, the other shows the march of Lieutenant-Colonel von Boltenstern in the Loir Valley, to which he was detached from Vendôme, at that date the most westerly advanced post of the 10th Prussian Army Corps.

Suffice it to say that, on reaching the defile of Troo, which was the limit of his advance, he not only found a superior force in his front, but, on his attempted return on his forward footsteps with the results of his reconnaissance, he found his flank menaced by another force at least ten times his superior in number, a large part of which was posted directly across both his lines of retreat. The whole narrative is most instructive. Clear perception of situation, and great resolution under what might have appeared to be overwhelming odds (on the part of the leader), thorough and unhesitating support (on the part of his subordinates), were the mainspring of his success, while not the least interesting portions of the narrative are those which depict the subsidiary incidents in which the younger Officers detached from the main column were involved.

If the promise of this first number is fulfilled in the future, which, from the well-known character of the work done by this branch of the Berlin General Staff, we see no reason to doubt, we believe that this series of publications will prove to be a very valuable addition to the library of the military student.—B. W.

Text-Book of Gunnery. By Captain G. Mackinlay, R.A. (Instructor in Artillery, Royal Military Academy, Woolwich). London: Printed under the superintendence of Her Majesty's Stationery Office. 1883. Pp. 192. Size $9\frac{3}{4}'' \times 6\frac{1}{4}'' \times \frac{3}{4}''$. Weight under 1 lb. Price 5*s*.

THIS work is the Text-Book of Gunnery at the Royal Military Academy, and is the successor to the "Principles of Gunnery," by Lieutenant-Colonel Sladen, which work is now out of print.

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[1] We hope before long to put this story before those of our readers who are not familiar with German.—L. A. H.